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TITLE: Systems and methods for secure transaction management and electronic rights protection

Brief Summary Text (52):

VDE allows electronic arrangements to be created involving two or more parties. These agreements can themselves comprise a collection of agreements between participants in a commercial value chain and/or a data security chain model for handling, auditing, reporting, and payment. It can provide efficient, reusable, modifiable, and consistent means for secure electronic content: distribution, usage control, usage payment, usage auditing, and usage reporting. Content may, for example, include: financial information such as electronic currency and credit; commercially distributed electronic information such as reference databases, movies, games, and advertising; and electronic properties produced by persons and organizations, such as documents, e-mail, and proprietary database information.

Brief Summary Text (55):

VDE offers an architecture that avoids reflecting specific distribution biases, administrative and control perspectives, and content types. Instead, VDE provides a broad-spectrum, fundamentally configurable and portable, electronic transaction control, distributing, usage, auditing, reporting, and payment operating environment. VDE is not limited to being an application or application specific toolset that covers only a limited subset of electronic interaction activities and participants. Rather, VDE supports systems by which such applications can be created, modified, and/or reused. As a result, the present invention answers pressing, unsolved needs by offering a system that supports a standardized control environment which facilitates interoperability of electronic appliances, interoperability of content containers, and efficient creation of electronic commerce applications and models through the use of a programmable, secure electronic transactions management foundation and reusable and extensible executable components. VDE can support a single electronic "world" within which most forms of electronic transaction activities can be managed.

Brief Summary Text (58):

VDE provides a secure, distributed electronic transaction management system for controlling the distribution and/or other usage of electronically provided and/or stored information. VDE controls auditing and reporting of electronic content and/or appliance usage. Users of VDE may include content creators who apply content usage, usage reporting, and/or usage payment related control information to electronic content and/or appliances for users such as end-user organizations, individuals, and content and/or appliance distributors. VDE also securely supports the payment of money owed (including money owed for content and/or appliance usage) by one or more parties to one or more other parties, in the form of electronic credit and/or currency.

Brief Summary Text (69):

VDE, for example, can employ: (1) Secure metering means for budgeting and/or auditing electronic content and/or appliance usage; (2) Secure flexible means for enabling compensation and/or billing rates for content and/or appliance usage,

including electronic credit and/or currency mechanisms for payment means; (3) Secure distributed database means for storing control and usage related information (and employing validated compartmentalization and tagging schemes); (4) Secure electronic appliance control means; (5) A distributed, secure, "virtual black box" comprised of nodes located at every user (including VDE content container creators, other content providers, client users, and recipients of secure VDE content usage information) site. The nodes of said virtual black box normally include a secure subsystem having at least one secure hardware element (a semiconductor element or other hardware module for securely executing VDE control processes), said secure subsystems being distributed at nodes along a pathway of information storage, distribution, payment, usage, and/or auditing. In some embodiments, the functions of said hardware element, for certain or all nodes, may be performed by software, for example, in host processing environments of electronic appliances; (6) Encryption and decryption means; (7) Secure communications means employing authentication, digital signaturing, and encrypted transmissions. The secure subsystems at said user nodes utilize a protocol that establishes and authenticates each node's and/or participant's identity, and establishes one or more secure host-to-host encryption keys for communications between the secure subsystems; and (8) Secure control means that can allow each VDE installation to perform VDE content authoring (placing content into VDE containers with associated control information), content distribution, and content usage; as well as clearinghouse and other administrative and analysis activities employing content usage information.

Brief Summary Text (70):

VDE may be used to migrate most non-electronic, traditional information delivery models (including entertainment, reference materials, catalog shopping, etc.) into an adequately secure digital distribution and usage management and payment context. The distribution and financial pathways managed by a VDE arrangement may include: content creator(s), distributor(s), redistributor(s), client administrator(s), client user(s), financial and/or other clearinghouse(s), and/or government agencies.

Brief Summary Text (73):

Secure VDE hardware (also known as SPU's for Secure Processing Units), or VDE installations that use software to substitute for, or complement, said hardware (provided by Host Processing Environments (HPEs)), operate in conjunction with secure communications, systems integration software, and distributed software control information and support structures, to achieve the electronic contract/rights protection environment of the present invention. Together, these VDE components comprise a secure, virtual, distributed content and/or appliance control, auditing (and other administration), reporting, and payment environment. In some embodiments and where commercially acceptable, certain VDE participants, such as clearinghouses that normally maintain sufficiently physically secure non-VDE processing environments, may be allowed to employ HPEs rather VDE hardware elements and interoperate, for example, with VDE end-users and content providers. VDE components together comprise a configurable, consistent, secure and "trusted" architecture for distributed, asynchronous control of electronic content and/or appliance usage. VDE supports a "universe wide" environment for electronic content delivery, broad dissemination, usage reporting, and usage related payment activities.

Brief Summary Text (74):

VDE provides generalized configurability. This results, in part, from decomposition of generalized requirements for supporting electronic commerce and data security into a broad range of constituent "atomic" and higher level components (such as load modules, data elements, and methods) that may be variously aggregated together to form control methods for electronic commerce applications, commercial electronic agreements, and data security arrangements. VDE provides a secure operating environment employing VDE foundation elements along with secure independently deliverable VDE components that enable electronic commerce models and relationships

to develop. VDE specifically supports the unfolding of distribution models in which content providers, over time, can expressly agree to, or allow, subsequent content providers and/or users participate in shaping the control information for, and consequences of, use of electronic content and/or appliances. A very broad range of the functional attributes important for supporting simple to very complex electronic commerce and data security activities are supported by capabilities of the present invention. As a result, VDE supports most types of electronic information and/or appliance: usage control (including distribution), security, usage auditing, reporting, other administration, and payment arrangements.

Brief Summary Text (79):

VDE allows the needs of electronic commerce participants to be served and it can bind such participants together in a universe wide, trusted commercial network that can be secure enough to support very large amounts of commerce. VDE's security and metering secure subsystem core will be present at all physical locations where VDE related content is (a) assigned usage related control information (rules and mediating data), and/or (b) used. This core can perform security and auditing functions (including metering) that operate within a "virtual black box," a collection of distributed, very secure VDE related hardware instances that are interconnected by secured information exchange (for example, telecommunication) processes and distributed database means. VDE further includes highly configurable transaction operating system technology, one or more associated libraries of load modules along with affiliated data, VDE related administration, data preparation, and analysis applications, as well as system software designed to enable VDE integration into host environments and applications. VDE's usage control information, for example, provide for property content and/or appliance related: usage authorization, usage auditing (which may include audit reduction), usage billing, usage payment, privacy filtering, reporting, and security related communication and encryption techniques.

Brief Summary Text (83):

VDE supports trusted (sufficiently secure) electronic information distribution and usage control models for both commercial electronic content distribution and data security applications. It can be configured to meet the diverse requirements of a network of interrelated participants that may include content creators, content distributors, client administrators, end users and/or clearinghouses and/or other content usage information users. These parties may constitute a network of participants involved in simple to complex electronic content dissemination, usage control, usage reporting, and/or usage payment. Disseminated content may include both originally provided and VDE generated information (such as content usage information) and content control information may persist through both chains (one or more pathways) of content and content control information handling, as well as the direct usage of content. The configurability provided by the present invention is particularly critical for supporting electronic commerce, that is enabling businesses to create relationships and evolve strategies that offer competitive value. Electronic commerce tools that are not inherently configurable and interoperable will ultimately fail to produce products (and services) that meet both basic requirements and evolving needs of most commerce applications.

Brief Summary Text (90):

VDEF transaction control elements reflect and enact content specific and/or more generalized administrative (for example, general operating system) control information. VDEF capabilities which can generally take the form of applications (application models) that have more or less configurability which can be shaped by VDE participants, through the use, for example, of VDE templates, to employ specific capabilities, along, for example, with capability parameter data to reflect the elements of one or more express electronic agreements between VDE participants in regards to the use of electronic content such as commercially distributed products. These control capabilities manage the use of, and/or auditing of use of, electronic content, as well as reporting information based upon content

use, and any payment for said use. VDEF capabilities may "evolve" to reflect the requirements of one or more successive parties who receive or otherwise contribute to a given set of control information. Frequently, for a VDE application for a given content model (such as distribution of entertainment on CD-ROM, content delivery from an Internet repository, or electronic catalog shopping and advertising, or some combination of the above) participants would be able to securely select from amongst available, alternative control methods and apply related parameter data, wherein such selection of control method and/or submission of data would constitute their "contribution" of control information. Alternatively, or in addition, certain control methods that have been expressly certified as securely interoperable and compatible with said application may be independently submitted by a participant as part of such a contribution. In the most general example, a generally certified load module (certified for a given VDE arrangement and/or content class) may be used with many or any VDE application that operates in nodes of said arrangement. These parties, to the extent they are allowed, can independently and securely add, delete, and/or otherwise modify the specification of load modules and methods, as well as add, delete or otherwise modify related information.

Brief Summary Text (95):

VDE ensures that certain prerequisites necessary for a given transaction to occur are met. This includes the secure execution of any required load modules and the availability of any required, associated data. For example, required load modules and data (e.g. in the form of a method) might specify that sufficient credit from an authorized source must be confirmed as available. It might further require certain one or more load modules execute as processes at an appropriate time to ensure that such credit will be used in order to pay for user use of the content. A certain content provider might, for example, require metering the number of copies made for distribution to employees of a given software program (a portion of the program might be maintained in encrypted form and require the presence of a VDE installation to run). This would require the execution of a metering method for copying of the property each time a copy was made for another employee. This same provider might also charge fees based on the total number of different properties licensed from them by the user and a metering history of their licensing of properties might be required to maintain this information.

Brief Summary Text (100):

VDE employs a variety of capabilities that serve as a foundation for a general purpose, sufficiently secure distributed electronic commerce solution. VDE enables an electronic commerce marketplace that supports divergent, competitive business partnerships, agreements, and evolving overall business models. For example, VDE includes features that: "sufficiently" impede unauthorized and/or uncompensated use of electronic information and/or appliances through the use of secure communication, storage, and transaction management technologies. VDE supports a model wide, distributed security implementation which creates a single secure "virtual" transaction processing and information storage environment. VDE enables distributed VDE installations to securely store and communicate information and remotely control the execution processes and the character of use of electronic information at other VDE installations and in a wide variety of ways; support low-cost, efficient, and effective security architectures for transaction control, auditing, reporting, and related communications and information storage. VDE may employ tagging related security techniques, the time-ageing of encryption keys, the compartmentalization of both stored control information (including differentially tagging such stored information to ensure against substitution and tampering) and distributed content (to, for many content applications, employ one or more content encryption keys that are unique to the specific VDE installation and/or user), private key techniques such as triple DES to encrypt content, public key techniques such as RSA to protect communications and to provide the benefits of digital signature and authentication to securely bind together the nodes of a VDE arrangement, secure processing of important transaction management executable code,

and a combining of a small amount of highly secure, hardware protected storage space with a much larger "exposed" mass media storage space storing secured (normally encrypted and tagged) control and audit information. VDE employs special purpose hardware distributed throughout some or all locations of a VDE implementation: a) said hardware controlling important elements of: content preparation (such as causing such content to be placed in a VDE content container and associating content control information with said content), content and/or electronic appliance usage auditing, content usage analysis, as well as content usage control; and b) said hardware having been designed to securely handle processing load module control activities, wherein said control processing activities may involve a sequence of required control factors; support dynamic user selection of information subsets of a VDE electronic information product (VDE controlled content). This contrasts with the constraints of having to use a few high level individual, pre-defined content provider information increments such as being required to select a whole information product or product section in order to acquire or otherwise use a portion of such product or section. VDE supports metering and usage control over a variety of increments (including "atomic" increments, and combinations of different increment types) that are selected ad hoc by a user and represent a collection of pre-identified one or more increments (such as one or more blocks of a preidentified nature, e.g., bytes, images, logically related blocks) that form a generally arbitrary, but logical to a user, content "deliverable." VDE control information (including budgeting, pricing and metering) can be configured so that it can specifically apply, as appropriate, to ad hoc selection of different, unanticipated variable user selected aggregations of information increments and pricing levels can be, at least in part, based on quantities and/or nature of mixed increment selections (for example, a certain quantity of certain text could mean associated images might be discounted by 15%; a greater quantity of text in the "mixed" increment selection might mean the images are discounted 20%). Such user selected aggregated information increments can reflect the actual requirements of a user for information and is more flexible than being limited to a single, or a few, high level, (e.g. product, document, database record) predetermined increments. Such high level increments may include quantities of information not desired by the user and as a result be more costly than the subset of information needed by the user if such a subset was available. In sum, the present invention allows information contained in electronic information products to be supplied according to user specification. Tailoring to user specification allows the present invention to provide the greatest value to users, which in turn will generate the greatest amount of electronic commerce activity. The user, for example, would be able to define an aggregation of content derived from various portions of an available content product, but which, as a deliverable for use by the user, is an entirely unique aggregated increment. The user may, for example, select certain numbers of bytes of information from various portions of an information product, such as a reference work, and copy them to disc in unencrypted form and be billed based on total number of bytes plus a surcharge on the number of "articles" that provided the bytes. A content provider might reasonably charge less for such a user defined information increment since the user does not require all of the content from all of the articles that contained desired information. This process of defining a user desired information increment may involve artificial intelligence database search tools that contribute to the location of the most relevant portions of information from an information product and cause the automatic display to the user of information describing search criteria hits for user selection or the automatic extraction and delivery of such portions to the user. VDE further supports a wide variety of predefined increment types including: bytes, images, content over time for audio or video, or any other increment that can be identified by content provider data mapping efforts, such as: sentences, paragraphs, articles, database records, and byte offsets representing increments of logically related information.

Brief Summary Text (102):

Use of bitmap meters (including "regular" and "wide" bitmap meters) to record usage

and/or purchase of information, in conjunction with other elements of the preferred embodiment of the present invention, uniquely supports efficient maintenance of usage history for: (a) rental, (b) flat fee licensing or purchase, (c) licensing or purchase discounts based upon historical usage variables, and (d) reporting to users in a manner enabling users to determine whether a certain item was acquired, or acquired within a certain time period (without requiring the use of conventional database mechanisms, which are highly inefficient for these applications). Bitmap meter methods record activities associated with electronic appliances, properties, objects, or portions thereof and/or administrative activities that are independent of specific properties, objects, etc., performed by a user and/or electronic appliance such that a content and/or appliance provider and/or controller of an administrative activity can determine whether a certain activity has occurred at some point, or during a certain period, in the past (for example, certain use of a commercial electronic content product and/or appliance). Such determinations can then be used as part of pricing and/or control strategies of a content and/or appliance provider, and/or controller of an administrative activity. For example, the content provider may choose to charge only once for access to a portion of a property, regardless of the number of times that portion of the property is accessed by a user. support "launchable" content, that is content that can be provided by a content provider to an end-user, who can then copy or pass along the content to other end-user parties without requiring the direct participation of a content provider to register and/or otherwise initialize the content for use. This content goes "out of (the traditional distribution) channel" in the form of a "traveling object." Traveling objects are containers that securely carry at least some permissions information and/or methods that are required for their use (such methods need not be carried by traveling objects if the required methods will be available at, or directly available to, a destination VDE installation). Certain travelling objects may be used at some or all VDE installations of a given VDE arrangement since they can make available the content control information necessary for content use without requiring the involvement of a commercial VDE value chain participant or data security administrator (e.g. a control officer or network administrator). As long as traveling object control information requirements are available at the user VDE installation, secure subsystem (such as the presence of a sufficient quantity of financial credit from an authorized credit provider), at least some travelling object content may be used by a receiving party without the need to establish a connection with a remote VDE authority (until, for example, budgets are exhausted or a time content usage reporting interval has occurred). Traveling objects can travel "out-of-channel," allowing, for example, a user to give a copy of a traveling object whose content is a software program, a movie or a game, to a neighbor, the neighbor being able to use the traveling object if appropriate credit (e.g. an electronic clearinghouse account from a clearinghouse such as VISA or AT&T) is available. Similarly, electronic information that is generally available on an Internet, or a similar network, repository might be provided in the form of a traveling object that can be downloaded and subsequently copied by the initial downloader and then passed along to other parties who may pass the object on to additional parties. provide very flexible and extensible user identification according to individuals, installations, by groups such as classes, and by function and hierarchical identification employing a hierarchy of levels of client identification (for example, client organization ID, client department ID, client network ID, client project ID, and client employee ID, or any appropriate subset of the above). provide a general purpose, secure, component based content control and distribution system that functions as a foundation transaction operating system environment that employs executable code pieces crafted for transaction control and auditing. These code pieces can be reused to optimize efficiency in creation and operation of trusted, distributed transaction management arrangements. VDE supports providing such executable code in the form of "atomic" load modules and associated data. Many such load modules are inherently configurable, aggregatable, portable, and extensible and singularly, or in combination (along with associated data), run as control methods under the VDE transaction operating environment. VDE can satisfy the requirements of widely

differing electronic commerce and data security applications by, in part, employing this general purpose transaction management foundation to securely process VDE transaction related control methods. Control methods are created primarily through the use of one or more of said executable, reusable load module code pieces (normally in the form of executable object components) and associated data. The component nature of control methods allows the present invention to efficiently operate as a highly configurable content control, system. Under the present invention, content control models can be iteratively and asynchronously shaped, and otherwise updated to accommodate the needs of VDE participants to the extent that such shaping and otherwise updating conforms to constraints applied by a VDE application, if any (e.g., whether new component assemblies are accepted and, if so, what certification requirements exist for such component assemblies or whether any or certain participants may shape any or certain control information by selection amongst optional control information (permissions record) control methods. This iterative (or concurrent) multiple participant process occurs as a result of the submission and use of secure, control information components (executable code such as load modules and/or methods, and/or associated data). These components may be contributed independently by secure communication between each control information influencing VDE participant's VDE installation and may require certification for use with a given application, where such certification was provided by a certification service manager for the VDE arrangement who ensures secure interoperability and/or reliability (e.g., bug control resulting from interaction) between appliances and submitted control methods. The transaction management control functions of a VDE electronic appliance transaction operating environment interact with non-secure transaction management operating system functions to properly direct transaction processes and data related to electronic information security, usage control, auditing, and usage reporting. VDE provides the capability to manages resources related to secure VDE content and/or appliance control information execution and data storage. facilitate creation of application and/or system functionality under VDE and to facilitate integration into electronic appliance environments of load modules and methods created under the present invention. To achieve this, VDE employs an Application Programmer's Interface (API) and/or a transaction operating system (such as a ROS) programming language with incorporated functions, both of which support the use of capabilities and can be used to efficiently and tightly integrate VDE functionality into commercial and user applications. support user interaction through: (a) "Pop-Up" applications which, for example, provide messages to users and enable users to take specific actions such as approving a transaction, (b) stand-alone VDE applications that provide administrative environments for user activities such as: end-user preference specifications for limiting the price per transaction, unit of time, and/or session, for accessing history information concerning previous transactions, for reviewing financial information such as budgets, expenditures (e.g. detailed and/or summary) and usage analysis information, and (c) VDE aware applications which, as a result of the use of a VDE API and/or a transaction management (for example, ROS based) programming language embeds VDE "awareness" into commercial or internal software (application programs, games, etc.) so that VDE user control information and services are seamlessly integrated into such software and can be directly accessed by a user since the underlying functionality has been integrated into the commercial software's native design. For example, in a VDE aware word processor application, a user may be able to "print" a document into a VDE content container object, applying specific control information by selecting from amongst a series of different menu templates for different purposes (for example, a confidential memo template for internal organization purposes may restrict the ability to "keep," that is to make an electronic copy of the memo). employ "templates" to ease the process of configuring capabilities of the present invention as they relate to specific industries or businesses. Templates are applications or application add-ons under the present invention. Templates support the efficient specification and/or manipulation of criteria related to specific content types, distribution approaches, pricing mechanisms, user interactions with content and/or administrative activities, and/or the like. Given the very large

range of capabilities and configurations supported by the present invention, reducing the range of configuration opportunities to a manageable subset particularly appropriate for a given business model allows the full configurable power of the present invention to be easily employed by "typical" users who would be otherwise burdened with complex programming and/or configuration design responsibilities template applications can also help ensure that VDE related processes are secure and optimally bug free by reducing the risks associated with the contribution of independently developed load modules, including unpredictable aspects of code interaction between independent modules and applications, as well as security risks associated with possible presence of viruses in such modules. VDE, through the use of templates, reduces typical user configuration responsibilities to an appropriately focused set of activities including selection of method types (e.g. functionality) through menu choices such as multiple choice, icon selection, and/or prompting for method parameter data (such as identification information, prices, budget limits, dates, periods of time, access rights to specific content, etc.) that supply appropriate and/or necessary data for control information purposes. By limiting the typical (non-programming) user to a limited subset of configuration activities whose general configuration environment (template) has been preset to reflect general requirements corresponding to that user, or a content or other business model can very substantially limit difficulties associated with content containerization (including placing initial control information on content), distribution, client administration, electronic agreement implementation, end-user interaction, and clearinghouse activities, including associated interoperability problems (such as conflicts resulting from security, operating system, and/or certification incompatibilities). Use of appropriate VDE templates can assure users that their activities related to content VDE containerization, contribution of other control information, communications, encryption techniques and/or keys, etc. will be in compliance with specifications for their distributed VDE arrangement. VDE templates constitute preset configurations that can normally be reconfigurable to allow for new and/or modified templates that reflect adaptation into new industries as they evolve or to reflect the evolution or other change of an existing industry. For example, the template concept may be used to provide individual, overall frameworks for organizations and individuals that create, modify, market, distribute, consume, and/or otherwise use movies, audio recordings and live performances, magazines, telephony based retail sales, catalogs, computer software, information data bases, multimedia, commercial communications, advertisements, market surveys, infomercials, games, CAD/CAM services for numerically controlled machines, and the like. As the context surrounding these templates changes or evolves, template applications provided under the present invention may be modified to meet these changes for broad use, or for more focused activities. A given VDE participant may have a plurality of templates available for different tasks. A party that places content in its initial VDE container may have a variety of different, configurable templates depending on the type of content and/or business model related to the content. An end-user may have different configurable templates that can be applied to different document types (e-mail, secure internal documents, database records, etc.) and/or subsets of users (applying differing general sets of control information to different bodies of users, for example, selecting a list of users who may, under certain preset criteria, use a certain document). Of course, templates may, under certain circumstances have fixed control information and not provide for user selections or parameter data entry. support plural, different control models regulating the use and/or auditing of either the same specific copy of electronic information content and/or differently regulating different copies (occurrences) of the same electronic information content. Differing models for billing, auditing, and security can be applied to the same piece of electronic information content and such differing sets of control information may employ, for control purposes, the same, or differing, granularities of electronic information control increments. This includes supporting variable control information for budgeting and auditing usage as applied to a variety of predefined increments of electronic information, including employing a variety of different budgets and/or metering increments for a given

electronic information deliverable for: billing units of measure, credit limit, security budget limit and security content metering increments, and/or market surveying and customer profiling content metering increments. For example, a CD-ROM disk with a database of scientific articles might be in part billed according to a formula based on the number of bytes decrypted, number of articles containing said bytes decrypted, while a security budget might limit the use of said database to no more than 5% of the database per month for users on the wide area network it is installed on. provide mechanisms to persistently maintain trusted content usage and reporting control information through both a sufficiently secure chain of handling of content and content control information and through various forms of usage of such content wherein said persistence of control may survive such use. Persistence of control includes the ability to extract information from a VDE container object by creating a new container whose contents are at least in part secured and that contains both the extracted content and at least a portion of the control information which control information of the original container and/or are at least in part produced by control information of the original container for this purpose and/or VDE installation control information stipulates should persist and/or control usage of content in the newly formed container. Such control information can continue to manage usage of container content if the container is "embedded" into another VDE managed object, such as an object which contains plural embedded VDE containers, each of which contains content derived (extracted) from a different source. enables users, other value chain participants (such as clearinghouses and government agencies), and/or user organizations, to specify preferences or requirements related to their use of electronic content and/or appliances. Content users, such as end-user customers using commercially distributed content (games, information resources, software programs, etc.), can define, if allowed by senior control information, budgets, and/or other control information, to manage their own internal use of content. Uses include, for example, a user setting a limit on the price for electronic documents that the user is willing to pay without prior express user authorization, and the user establishing the character of metering information he or she is willing to allow to be collected (privacy protection). This includes providing the means for content users to protect the privacy of information derived from their use of a VDE installation and content and/or appliance usage auditing. In particular, VDE can prevent information related to a participant's usage of electronic content from being provided to other parties without the participant's tacit or explicit agreement. provide mechanisms that allow control information to "evolve" and be modified according, at least in part, to independently, securely delivered

Brief Summary Text (103):

further control information. Said control information may include executable code (e.g., load modules) that has been certified as acceptable (e.g., reliable and trusted) for use with a specific VDE application, class of applications, and/or a VDE distributed arrangement. This modification (evolution) of control information can occur upon content control information (load modules and any associated data) circulating to one or more VDE participants in a pathway of handling of control information, or it may occur upon control information being received from a VDE participant. Handlers in a pathway of handling of content control information, to the extent each is authorized, can establish, modify, and/or contribute to, permission, auditing, payment, and reporting control information related to controlling, analyzing, paying for, and/or reporting usage of, electronic content and/or appliances (for example, as related to usage of VDE controlled property content). Independently delivered (from an independent source which is independent except in regards to certification), at least in part secure, control information can be employed to securely modify content control information when content control information has flowed from one party to another party in a sequence of VDE content control information handling. This modification employs, for example, one or more VDE component assemblies being securely processed in a VDE secure subsystem. In an alternate embodiment, control information may be modified by a senior party through use of their VDE installation secure sub-system after receiving submitted, at least

in part secured, control information from a "junior" party, normally in the form of a VDE administrative object. Control information passing along VDE pathways can represent a mixed control set, in that it may include: control information that persisted through a sequence of control information handlers, other control information that was allowed to be modified, and further control information representing new control information and/or mediating data. Such a control set represents an evolution of control information for disseminated content. In this example the overall content control set for a VDE content container is "evolving" as it securely (e.g. communicated in encrypted form and using authentication and digital signaturing techniques) passes, at least in part, to a new participant's VDE installation where the proposed control information is securely received and handled. The received control information may be integrated (through use of the receiving parties' VDE installation secure sub-system) with in-place control information through a negotiation process involving both control information sets. For example, the modification, within the secure sub-system of a content provider's VDE installation, of content control information for a certain VDE content container may have occurred as a result of the incorporation of required control information provided by a financial credit provider. Said credit provider may have employed their VDE installation to prepare and securely communicate (directly or indirectly) said required control information to said content provider. Incorporating said required control information enables a content provider to allow the credit provider's credit to be employed by a content end-user to compensate for the end-user's use of VDE controlled content and/or appliances, so long as said end-user has a credit account with said financial credit provider and said credit account has sufficient credit available. Similarly, control information requiring the payment of taxes and/or the provision of revenue information resulting from electronic commerce activities may be securely received by a content provider. This control information may be received, for example, from a government agency. Content providers might be required by law to incorporate such control information into the control information for commercially distributed content and/or services related to appliance usage. Proposed control information is used to an extent allowed by senior control information and as determined by any negotiation trade-offs that satisfy priorities stipulated by each set (the received set and the proposed set). VDE also accommodates different control schemes specifically applying to different participants (e.g., individual participants and/or participant classes (types in a network of VDE content handling participants. support multiple simultaneous control models for the same content property and/or property portion. This allows, for example, for concurrent business activities which are dependent on electronic commercial product content distribution, such as acquiring detailed market survey information and/or supporting advertising, both of which can increase revenue and result in lower content costs to users and greater value to content providers. Such control information and/or overall control models may be applied, as determined or allowed by control information, in differing manners to different participants in a pathway of content, reporting, payment, and/or related control information handling. VDE supports applying different content control information to the same and/or different content and/or appliance usage related activities, and/or to different parties in a content and/or appliance usage model, such that different parties (or classes of VDE users, for example) are subject to differing control information managing their use of electronic information content. For example, differing control models based on the category of a user as a distributor of a VDE controlled content object or an end-user of such content may result in different budgets being applied. Alternatively, for example, a one distributor may have the right to distribute a different array of properties than another distributor (from a common content collection provided, for example, on optical disc). An individual, and/or a class or other grouping of end-users, may have different costs (for example, a student, senior citizen, and/or poor citizen user of content who may be provided with the same or differing discounts) than a "typical" content user. support provider revenue information resulting from customer use of content and/or appliances, and/or provider and/or end-user payment of taxes, through the transfer of credit and/or electronic currency from said end-user and/or provider to a

government agency, might occur "automatically" as a result of such received control information causing the generation of a VDE content container whose content includes customer content usage information reflecting secure, trusted revenue summary information and/or detailed user transaction listings (level of detail might depend, for example on type or size of transaction--information regarding a bank interest payment to a customer or a transfer of a large (e.g. over \$10,000) might be, by law, automatically reported to the government). Such summary and/or detailed information related to taxable events and/or currency, and/or creditor currency transfer, may be passed along a pathway of reporting and/or payment to the government in a VDE container. Such a container may also be used for other VDE related content usage reporting information. support the flowing of content control information through different "branches" of content control information handling so as to accommodate, under the present invention's preferred embodiment, diverse controlled distributions of VDE controlled content. This allows different parties to employ the same initial electronic content with differing (perhaps competitive) control strategies. In this instance, a party who first placed control information on content can make certain control assumptions and these assumptions would evolve into more specific and/or extensive control assumptions. These control assumptions can evolve during the branching sequence upon content model participants submitting control information changes, for example, for use in "negotiating" with "in place" content control information. This can result in new or modified content control information and/or it might involve the selection of certain one or more already "in-place" content usage control methods over in-place alternative methods, as well as the submission of relevant control information parameter data. This form of evolution of different control information sets applied to different copies of the same electronic property content and/or appliance results from VDE control information flowing "down" through different branches in an overall pathway of handling and control and being modified differently as it diverges down these different pathway branches. This ability of the present invention to support multiple pathway branches for the flow of both VDE content control information and VDE managed content enables an electronic commerce marketplace which supports diverging, competitive business partnerships, agreements, and evolving overall business models which can employ the same content properties combined, for example, in differing collections of content representing differing at least in part competitive products. enable a user to securely extract, through the use of the secure subsystem at the user's VDE installation, at least a portion of the content included within a VDE content container to produce a new, secure object (content container), such that the extracted information is maintained in a continually secure manner through the extraction process. Formation of the new VDE container containing such extracted content shall result in control information consistent with, or specified by, the source VDE content container, and/or local VDE installation secure subsystem as appropriate, content control information. Relevant control information, such as security and administrative information, derived; at least in part, from the parent (source) object's control information, will normally be automatically inserted into a new VDE content container object containing extracted VDE content. This process typically occurs under the control framework of a parent object and/or VDE installation control information executing at the users VDE installation secure subsystem (with, for example, at least a portion of this inserted control information being stored securely in encrypted form in one or more permissions records). In an alternative embodiment, the derived content control information applied to extracted content may be in part or whole derived from, or employ, content control information stored remotely from the VDE installation that performed the secure extraction such as at a remote server location. As with the content control information for most VDE managed content, features of the present invention allows the content's control information to: (a) "evolve," for example, the extractor of content may add new control methods and/or modify control parameter data, such as VDE application compliant methods, to the extent allowed by the content's in-place control information. Such new control information might specify, for example, who may use at least a portion of the new object, and/or how said at least a portion of said extracted content may be used (e.g. when at least a

portion may be used, or what portion or quantity of portions may be used); (b) allow a user to combine additional content with at least a portion of said extracted content, such as material authored by the extractor and/or content (for example, images, video, audio, and/or text) extracted from one or more other VDE container objects for placement directly into the new container; (c) allow a user to securely edit at least a portion of said content while maintaining said content in a secure form within said VDE content container; (d) append extracted content to a pre-existing VDE content container object and attach associated control information--in these cases, user added information may be secured, e.g., encrypted, in part or as a whole, and may be subject to usage and/or auditing control information that differs from the those applied to previously in place object content; (e) preserve VDE control over one or more portions of extracted content after various forms of usage of said portions, for example, maintain content in securely stored form while allowing "temporary" on screen display of content or allowing a software program to be maintained in secure form but transiently decrypt any encrypted executing portion of said program (all, or only a portion, of said program may be encrypted to secure the program).

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Generally, the extraction features of the present invention allow users to aggregate and/or disseminate and/or otherwise use protected electronic content information extracted from content container sources while maintaining secure VDE capabilities thus preserving the rights of providers in said content information after various content usage processes. support the aggregation of portions of VDE controlled content, such portions being subject to differing VDE content container control information, wherein various of said portions may have been provided by independent, different content providers from one or more different locations remote to the user performing the aggregation. Such aggregation, in the preferred embodiment of the present invention, may involve preserving at least a portion of the control information (e.g., executable code such as load modules) for each of various of said portions by, for example, embedding some or all of such portions individually as VDE content container objects within an overall VDE content container and/or embedding some or all of such portions directly into a VDE content container. In the latter case, content control information of said content container may apply differing control information sets to various of such portions based upon said portions original control information requirements before aggregation. Each of such embedded VDE content container may have its own control information in the form of one or more permissions records. Alternatively, a negotiation between control information associated with various aggregated portions of electronic content, may produce a control information set that would govern some or all of the aggregated content portions. The VDE content control information produced by the negotiation may be uniform (such as having the same load modules and/or component assemblies, and/or it may apply differing such content control information to two or more portions that constitute an aggregation of VDE controlled content such as differing metering, budgeting, billing and/or payment models. For example, content usage payment may be automatically made, either through a clearinghouse, or directly, to different content providers for different portions. enable flexible metering of, or other collection of information related to, use of electronic content and/or electronic appliances. A feature of the present invention enables such flexibility of metering control mechanisms to accommodate a simultaneous, broad array of: (a) different parameters related to electronic information content use; (b) different increment units (bytes, documents, properties, paragraphs, images, etc.) and/or other organizations of such electronic content; and/or (c) different categories of user and/or VDE installation types, such as client organizations, departments, projects, networks, and/or individual users, etc. This feature of the present invention can be employed for content security, usage analysis (for example, market surveying), and/or compensation based upon the use and/or exposure to VDE managed content. Such metering is a flexible basis for ensuring payment for content royalties, licensing, purchasing, and/or advertising. A feature of the present invention provides for

payment means supporting flexible electronic currency and credit mechanisms, including the ability to securely maintain audit trails reflecting information related to use of such currency or credit. VDE supports multiple differing hierarchies of client organization control information wherein an organization client administrator distributes control information specifying the usage rights of departments, users, and/or projects. Likewise, a department (division) network manager can function as a distributor (budgets, access rights, etc.) for department networks, projects, and/or users, etc. provide scalable, integratable, standardized control means for use on electronic appliances ranging from inexpensive consumer (for example, television set-top appliances) and professional devices (and hand-held PDAs) to servers, mainframes, communication switches, etc. The scalable transaction management/auditing technology of the present invention will result in more efficient and reliable interoperability amongst devices functioning in electronic commerce and/or data security environments. As standardized physical containers have become essential to the shipping of physical goods around the world, allowing these physical containers to universally "fit" unloading equipment, efficiently use truck and train space, and accommodate known arrays of objects (for example, boxes) in an efficient manner, so VDE electronic content containers may, as provided by the present invention, be able to efficiently move electronic information content (such as commercially published properties, electronic currency and credit, and content audit information), and associated content control information, around the world Interoperability is fundamental to efficient electronic commerce. The design of the VDE foundation, VDE load modules, and VDE containers, are important features that enable the VDE node operating environment to be compatible with a very broad range of electronic appliances. The ability, for example, for control methods based on load modules to execute in very "small" and inexpensive secure sub-system environments, such as environments with very little read/write memory, while also being able to execute in large memory sub-systems that may be used in more expensive electronic appliances, supports consistency across many machines. This consistent VDE operating environment, including its control structures and container architecture, enables the use of standardized VDE content containers across a broad range of device types and host operating environments. Since VDE capabilities can be seamlessly integrated as extensions, additions, and/or modifications to fundamental capabilities of electronic appliances and host operating systems, VDE containers, content control information, and the VDE foundation will be able to work with many device types and these device types will be able to consistently and efficiently interpret and enforce VDE control information. Through this integration users can also benefit from a transparent interaction with many of the capabilities of VDE. VDE integration with software operating on a host electronic appliance supports a variety of capabilities that would be unavailable or less secure without such integration. Through integration with one or more device applications and/or device operating environments, many capabilities of the present invention can be presented as inherent capabilities of a given electronic appliance, operating system, or appliance application. For example, features of the present invention include: (a) VDE system software to in part extend and/or modify host operating systems such that they possesses VDE capabilities, such as enabling secure transaction processing and electronic information storage; (b) one or more application programs that in part represent tools associated with VDE operation; and/or (c) code to be integrated into application programs, wherein such code incorporates references into VDE system software to integrate VDE capabilities and makes such applications VDE aware (for example, word processors, database retrieval applications, spreadsheets, multimedia presentation authoring tools, film editing software, music editing software such as MIDI applications and the like, robotics control systems such as those associated with CAD/CAM environments and NCM software and the like, electronic mail systems, teleconferencing software, and other data authoring, creating, handling, and/or usage applications including combinations of the above). These one or more features (which may also be implemented in firmware or hardware) may be employed in conjunction with a VDE node secure hardware processing capability, such as a microcontroller(s), microprocessor(s), other CPU(s) or other

digital processing logic. employ audit reconciliation and usage pattern evaluation processes that assess, through certain, normally network based, transaction processing reconciliation and threshold checking activities, whether certain violations of security of a VDE arrangement have occurred. These processes are performed remote to VDE controlled content end-user VDE locations by assessing, for example, purchases, and/or requests, for electronic properties by a given VDE installation. Applications for such reconciliation activities include assessing whether the quantity of remotely delivered VDE controlled content corresponds to the amount of financial credit and/or electronic currency employed for the use of such content. A trusted organization can acquire information from content providers concerning the cost for content provided to a given VDE installation and/or user and compare this cost for content with the credit and/or electronic currency disbursements for that installation and/or user. Inconsistencies in the amount of content delivered versus the amount of disbursement can prove, and/or indicate, depending on the circumstances, whether the local VDE installation has been, at least to some degree, compromised (for example, certain important system security functions, such as breaking encryption for at least some portion of the secure subsystem and/or VDE controlled content by uncovering one or more keys). Determining whether irregular patterns (e.g. unusually high demand) of content usage, or requests for delivery of certain kinds of VDE controlled information during a certain time period by one or more VDE installations and/or users (including, for example, groups of related users whose aggregate pattern of usage is suspicious) may also be useful in determining whether security at such one or more installations, and/or by such one or more users, has been compromised, particularly when used in combination with an assessment of electronic credit and/or currency provided to one or more VDE users and/or installations, by some or all of their credit and/or currency suppliers, compared with the disbursements made by such users and/or installations. support security techniques that materially increase the time required to "break" a system's integrity. This includes using a collection of techniques that minimizes the damage resulting from comprising some aspect of the security features of the present inventions. provide a family of authoring, administrative, reporting, payment, and billing tool user applications that comprise components of the present invention's trusted/secure, universe wide, distributed transaction control and administration system. These components support VDE related: object creation (including placing control information on content), secure object distribution and management (including distribution control information, financial related, and other usage analysis), client internal VDE activities administration and control, security management, user interfaces, payment disbursement, and clearinghouse related functions. These components are designed to support highly secure, uniform, consistent, and standardized: electronic commerce and/or data security pathway(s) of handling, reporting, and/or payment; content control and administration; and human factors (e.g. user interfaces). support the operation of a plurality of clearinghouses, including, for example, both financial and user clearinghouse activities, such as those performed by a client administrator in a large organization to assist in the organization's use of a VDE arrangement, including usage information analysis, and control of VDE activities by individuals and groups of employees such as specifying budgets and the character of usage rights available under VDE for certain groups of and/or individual, client personnel, subject to control information series to control information submitted by the client administrator. At a clearinghouse, one or more VDE installations may operate together with a trusted distributed database environment (which may include concurrent database processing means). A financial clearinghouse normally receives at its location securely delivered content usage information, and user requests (such as requests for further credit, electronic currency, and/or higher credit limit). Reporting of usage information and user requests can be used for supporting electronic currency, billing, payment and credit related activities, and/or for user profile analysis and/or broader market survey analysis and marketing (consolidated) list generation or other information derived, at least in part, from said usage information. this information can be provided to content providers or other parties, through secure, authenticated

encrypted communication to the VDE installation secure subsystems. Clearinghouse processing means would normally be connected to specialized I/O means, which may include high speed telecommunication switching means that may be used for secure communications between a clearinghouse and other VDE pathway participants. securely support electronic currency and credit usage control, storage, and communication at, and between, VDE installations. VDE further supports automated passing of electronic currency and/or credit information, including payment tokens (such as in the form of electronic currency or credit) or other payment information, through a pathway of payment, which said pathway may or may not be the same as a pathway for content usage information reporting. Such payment may be placed into a VDE container created automatically by a VDE installation in response to control information stipulating the "withdrawal" of credit or electronic currency from an electronic credit or currency account based upon an amount owed resulting from usage of VDE controlled electronic content and/or appliances. Payment credit or currency may then be automatically communicated in protected (at least in part encrypted) form through telecommunication of a VDE container to an appropriate party such as a clearinghouse, provider of original property content or appliance, or an agent for such provider (other than a clearinghouse). Payment information may be packaged in said VDE content container with, or without, related content usage information, such as metering information. An aspect of the present invention further enables certain information regarding currency use to be specified as unavailable to certain, some, or all VDE parties ("conditionally" to fully anonymous currency) and/or further can regulate certain content information, such as currency and/or credit use related information (and/or other electronic information usage data) to be available only under certain strict circumstances, such as a court order (which may itself require authorization through the use of a court controlled VDE installation that may be required to securely access "conditionally" anonymous information). Currency and credit information, under the preferred embodiment of the present invention, is treated as administrative content; support fingerprinting (also known as watermarking) for embedding in content such that when content protected under the present invention is released in clear form from a VDE object (displayed, printed, communicated, extracted, and/or saved), information representing the identification of the user and/or VDE installation responsible for transforming the content into clear form is embedded into the released content. Fingerprinting is useful in providing an ability to identify who extracted information in clear form a VDE container, or who made a copy of a VDE object or a portion of its contents. Since the identity of the user and/or other identifying information may be embedded in an obscure or generally concealed manner, in VDE container content and/or control information, potential copyright violators may be deterred from unauthorized extraction or copying. Fingerprinting normally is embedded into unencrypted electronic content or control information, though it can be embedded into encrypted content and later place in unencrypted content in a secure VDE installation sub-system as the encrypted content carrying the fingerprinting information is decrypted. Electronic information, such as the content of a VDE container, may be fingerprinted as it leaves a network (such as Internet) location bound for a receiving party. Such repository information may be maintained in unencrypted form prior to communication and be encrypted as it leaves the repository. Fingerprinting would preferably take place as the content leaves the repository, but before the encryption step. Encrypted repository content can be decrypted, for example in a secure VDE sub-system, fingerprint information can be inserted, and then the content can be re-encrypted for transmission. Embedding identification information of the intended recipient user and/or VDE installation into content as it leaves, for example, an Internet repository, would provide important information that would identify or assist in identifying any party that managed to compromise the security of a VDE installation or the delivered content. If a party produces an authorized clear form copy of VDE controlled content, including making unauthorized copies of an authorized clear form copy, fingerprint information would point back to that individual and/or his or her VDE

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installation. Such bidden information will act as a strong disincentive that should dissuade a substantial portion of potential content "pirates" from stealing other parties electronic information. Fingerprint inflation identifying a receiving party and/or VDE installation can be embedded into a VDE object before or during, decryption, replication, or communication of VDE content objects to receivers. Fingerprinting electronic content before it is encrypted for transfer to a customer or other user provides information that can be very useful for identifying who received certain content which may have then been distributed or made available in unencrypted form. This information would be useful in tracking who may have "broken" the security of a VDE installation and was illegally making certain electronic content available to others. Fingerprinting may provide additional, available information such as time and/or date of the release (for example extraction) of said content information. Locations for inserting fingerprints may be specified by VDE installation and/or content container control information. This information may specify that certain areas and/or precise locations within properties should be used for fingerprinting, such as one or more certain fields of information or information types. Fingerprinting information may be incorporated into a property by modifying in a normally undetectable way color frequency and/or the brightness of certain image pixels, by slightly modifying certain audio signals as to frequency, by modifying font character formation, etc. Fingerprint information, itself, should be encrypted so as to make it particularly difficult for tampered fingerprints to be interpreted as valid. Variations in fingerprint locations for different copies of the same property; "false" fingerprint information; and multiple copies of fingerprint information within a specific property or other contents which copies employ different fingerprinting techniques such as information distribution patterns, frequency and/or brightness manipulation, and encryption related techniques, are features of the present invention for increasing the difficulty of an unauthorized individual identifying fingerprint locations and erasing and/or modifying fingerprint information. provide smart object agents that can carry requests, data, and/or methods, including budgets, authorizations, credit or currency, and content. For example, smart objects may travel to and/or from remote information resource locations and fulfill requests for electronic information content. Smart objects can, for example, be transmitted to a remote location to perform a specified database search on behalf of a user or otherwise "intelligently" search remote one or more repositories of information for user desired information. After identifying desired information at one or more remote locations, by for example, performing one or more database searches, a smart object may return via communication to the user in the form of a secure "return object" containing retrieved information. A user may be charged for the remote retrieving of information, the returning of information to the user's VDE installation, and/or the use of such information. In the latter case a user may be charged only for the information in the return object that the user actually uses. Smart objects may have the means to request use of one of more services and/or resources. Services include locating other services and/or resources such as information resources, language or format translation, processing, credit (or additional credit) authorization, etc. Resources include reference databases, networks, high powered or specialized computing resources (the smart object may carry information to another computer to be efficiently processed and then return the information to the sending VDE installation), remote object repositories, etc. Smart objects can make efficient use of remote resources (e.g. centralized databases, super computers, etc.) while providing a secure means for charging users based on information and/or resources actually used. support both "translations" of VDE electronic agreements elements into modern language printed agreement elements (such as English language agreements) and translations of electronic rights protection/transaction management modern language agreement elements to electronic VDE agreement elements. This feature requires maintaining a library of textual language that corresponds to VDE load modules and/or methods and/or component assemblies. As VDE methods are proposed and/or employed for VDE agreements, a listing of textual terms and conditions can be produced by a VDE user application

which, in a preferred embodiment, provides phrases, sentences and/or paragraphs that have been stored and correspond to said methods and/or assemblies. This feature preferably employs artificial intelligence capabilities to analyze and automatically determine, and/or assist one or more users to determine, the proper order and relationship between the library elements corresponding to, the chosen methods and/or assemblies so as to compose some or all portions of a legal or descriptive document. One or more users, and/or preferably an attorney (if the document a legal, binding agreement), would review the generated document material upon completion and employ such additional textual information and/or editing as necessary to describe non electronic transaction elements of the agreement and make any other improvements that may be necessary. These features further support employing modern language tools that allow one or more users to make selections from choices and provide answers to questions and to produce a VDE electronic agreement from such a process. This process can be interactive and the VDE agreement formulation process may employ artificial intelligence expert system technology that learns from responses and, where appropriate and based at least in part on said responses, provides further choices and/or questions which "evolves" the desired VDE electronic agreement. support the use of multiple VDE secure subsystems in a single VDE installation. Various security and/or performance advantages may be realized by employing a distributed VDE design within a single VDE installation. For example, designing a hardware based VDE secure subsystem into an electronic appliance VDE display device, and designing said subsystem's integration with said display device so that it is as close as possible to the point of display, will increase the security for video materials by making it materially more difficult to "steal" decrypted video information as it moves from outside to inside the video system. Ideally, for example, a VDE secure hardware module would be in the same physical package as the actual display monitor, such as within the packaging of a video monitor or other display device, and such device would be designed, to the extent commercially practical, to be as tamper resistant as reasonable. As another example, embedding a VDE hardware module into an I/O peripheral may have certain advantages from the standpoint of overall system throughput. If multiple VDE instances are employed within the same VDE installation, these instances will ideally share resources to the extent practical, such as VDE instances storing certain control information and content and/or appliance usage information on the same mass storage device and in the same VDE management database. requiring reporting and payment compliance by employing exhaustion of budgets and time ageing of keys. For example, a VDE commercial arrangement and associated content control information may involve a content provider's content and the use of clearinghouse credit for payment for end-user usage of said content. Control information regarding said arrangement may be delivered to a user's (of said content) VDE installation and/or said financial clearinghouse's VDE installation. Said control information might require said clearinghouse to prepare and telecommunicate to said content provider both content usage based information in a certain form, and content usage payment in the form of electronic credit (such credit might be "owned" by the provider after receipt and used in lieu of the availability or adequacy of electronic currency) and/or electronic currency. This delivery of information and payment may employ trusted VDE installation secure subsystems to securely, and in some embodiments, automatically, provide in the manner specified by said control information, said usage information and payment content. Features of the present invention help ensure that a requirement that a clearinghouse report such usage information and payment content will be observed. For example, if one participant to a VDE electronic agreement fails to observe such information reporting and/or paying obligation, another participant can stop the delinquent party from successfully participating in VDE activities related to such agreement. For example if required usage information and payment was not reported as specified by content control information, the "injured" party can fail to provide, through failing to securely communicate from his VDE installation secure subsystem, one or more pieces of secure information necessary for the continuance of one or more critical processes. For example, failure to report information and/or payment from a clearinghouse to a

content provider (as well as any security failures or other disturbing irregularities) can result in the content provider not providing key and/or budget refresh information to the clearinghouse, which information can be necessary to authorize use of the clearinghouse's credit for usage of the provider's content and which the clearinghouse would communicate to end-user's during a content usage reporting communication between the clearinghouse and end-user. As another example, a distributor that failed to make payments and/or report usage information to a content provider might find that their budget for creating permissions records to distribute the content provider's content to users, and/or a security budget limiting one or more other aspect of their use of the provider's content, are not being refreshed by the content provider, once exhausted or timed-out (for example, at a predetermined date). In these and other cases, the offended party might decide not to refresh time ageing keys that had "aged out." Such a use of time aged keys has a similar impact as failing to refresh budgets or time-aged authorizations. support smart card implementations of the present invention in the form of portable electronic appliances, including cards that can be employed as secure credit, banking, and/or money cards. A feature of the present invention is the use of portable VDEs as transaction cards at retail and other establishments, wherein such cards can "dock" with an establishment terminal that has a VDE secure sub-system and/or an online connection to a VDE secure and/or otherwise secure and compatible subsystem, such as a "trusted" financial clearinghouse (e.g., VISA, Mastercard). The VDE card and the terminal (and/or online connection) can securely exchange information related to a transaction, with credit and/or electronic currency being transferred to a merchant and/or clearinghouse and transaction information flowing back to the card. Such a card can be used for transaction activities of all sorts. A docking station, such as a PCMCIA connector on an electronic appliance, such as a personal computer, can receive a consumer's VDE card at home. Such a station/card combination can be used for on-line transactions in the same manner as a VDE installation that is permanently installed in such an electronic appliance. The card can be used as an "electronic wallet" and contain electronic currency as well as credit provided by a clearinghouse. The card can act as convergence point for financial activities of a consumer regarding many, if not all, merchant, banking, and on-line financial transactions, including supporting home banking activities. A consumer can receive his paycheck and/or investment earnings and/or "authentic" VDE content container secured detailed information on such receipts, through on-line connections. A user can send digital currency to another party with a VDE arrangement, including giving away such currency. A VDE card can retain details of transactions in a highly secure and database organized fashion so that financially related information is both consolidated and very easily retrieved and/or analyzed. Because of the VDE security, including use of effective encryption, authentication, digital signaturing, and secure database structures, the records contained within a VDE card arrangement may be accepted as valid transaction records for government and/or corporate recordkeeping requirements. In some embodiments of the present invention a VDE card may employ docking station and/or electronic appliance storage means and/or share other VDE arrangement means local to said appliance and/or available across a network, to augment the information storage capacity of the VDE card, by for example, storing dated, and/or archived, backup information. Taxes relating to some or all of an individual's financial activities may be automatically computed based on "authentic" information securely stored and available to said VDE card. Said information may be stored in said card, in said docking station, in an associated electronic appliance, and/or other device operatively attached thereto, and/or remotely, such as at a remote server site. A card's data, e.g. transaction history, can be backed up to an individual's personal computer or other electronic appliance and such an appliance may have an integrated VDE installation of its own. A current transaction, recent transactions (for redundancy), or all or other selected card data may be backed up to a remote backup repository, such a VDE compatible repository at a financial clearinghouse, during each or periodic docking for a financial transaction and/or information communication such as a user/merchant transaction. Backing up at least the current transaction during a connection with another party's VDE installation (for example

a VDE installation that is also on a financial or general purpose electronic network), by posting transaction information to a remote clearinghouse and/or bank, can ensure that sufficient backup is conducted to enable complete reconstruction of VDE card internal information in the event of a card failure or loss. support certification processes that ensure authorized interoperability between various VDE installations so as to prevent VDE arrangements and/or installations that unacceptably deviate in specification protocols from other VDE arrangements and/or installations from interoperating in a manner that may introduce security (integrity and/or confidentiality of VDE secured information), process control, and/or software compatibility problems. Certification validates the identity of VDE installations and/or their components, as well as VDE users. Certification data can also serve as information that contributes to determining the decommissioning or other change related to VDE sites. support the separation of fundamental transaction control processes through the use of event (triggered) based method control mechanisms. These event methods trigger one or more other VDE methods (which are available to a secure VDE sub-system) and are used to carry out VDE managed transaction related processing. These triggered methods include independently (separably) and securely processable component billing management methods, budgeting management methods, metering management methods, and related auditing management processes. As a result of this feature of the present invention, independent triggering of metering, auditing, billing, and budgeting methods, the present invention is able to efficiently, concurrently support multiple financial currencies (e.g. dollars, marks, yen) and content related budgets, and/or billing increments as well as very flexible content distribution models. support, complete, modular separation of the control structures related to (1) content event triggering, (2) auditing, (3) budgeting (including specifying no right of use or unlimited right of use) (4) billing, and (5) user identity (VDE installation, client name, department, network, and/or user, etc.). The independence of these VDE control structures provides a flexible system which allows plural relationships between two or more of these structures, for example, the ability to associate a financial budget with different event trigger structures (that are put in place to enable controlling content based on its logical portions). Without such separation between these basic VDE capabilities, it would be more difficult to efficiently maintain separate metering, budgeting, identification, and/or billing activities which involve the same, differing (including overlapping), or entirely different, portions of content for metering, billing, budgeting, and user identification, for example, paying fees associated with usage of content, performing home banking, managing advertising services, etc. VDE modular separation of these basic capabilities supports the programming of plural, "arbitrary" relationships between one or differing content portions (and/or portion units) and budgeting, auditing, and/or billing control information. For

Brief Summary Text (116):

Normally, most usage, audit, reporting, payment, and distribution control methods are themselves at least in part encrypted and are executed by the secure subsystem of a VDE installation. Thus, for example, billing and metering records can be securely generated and updated, and encryption and decryption keys are securely utilized, within a secure subsystem. Since VDE also employs secure (e.g. encrypted and authenticated) communications when passing information between the participant location (nodes) secure subsystems of a VDE arrangement, important components of a VDE electronic agreement can be reliably enforced with sufficient security (sufficiently trusted) for the intended commercial purposes. A VDE electronic agreement for a value chain can be composed, at least in part, of one or more subagreements between one or more subsets of the value chain participants. These subagreements are comprised of one or more electronic contract "compliance" elements (methods including associated parameter data) that ensure the protection of the rights of VDE participants.

Brief Summary Text (118):

The updating of property management files at each location of a VDE arrangement, to

accommodate new or modified control information, is performed in the VDE secure subsystem and under the control of secure management file updating programs executed by the protected subsystem. Since all secure communications are at least in part encrypted and the processing inside the secure subsystem is concealed from outside observation and interference, the present invention ensures that content control information can be enforced. As a result, the creator and/or distributor and/or client administrator and/or other contributor of secure control information for each property (for example, an end-user restricting the kind of audit information he or she will allow to be reported and/or a financial clearinghouse establishing certain criteria for use of its credit for payment for use of distributed content) can be confident that their contributed and accepted control information will be enforced (within the security limitations of a given VDE security implementation design). This control information can determine, for example: (1) How and/or to whom electronic content can be provided, for example, how an electronic property can be distributed; (2) How one or more objects and/or properties, or portions of an object or property, can be directly used, such as decrypted, displayed, printed, etc; (3) How payment for usage of such content and/or content portions may or must be handled; and (4) How audit information about usage information related to at least a portion of a property should be collected, reported, and/or used.

Brief Summary Text (122):

VDE supports commercially secure "extended" value chain electronic agreements. VDE can be configured to support the various underlying agreements between parties that comprise this extended agreement. These agreements can define important electronic commerce considerations including: (1) security, (2) content use control, including electronic distribution, (3) privacy (regarding, for example, information concerning parties described by medical, credit, tax, personal, and/or of other forms of confidential information), (4) management of financial processes, and (5) pathways of handling for electronic content, content and/or appliance control information, electronic content and/or appliance usage information and payment and/or credit.

Brief Summary Text (123):

VDE agreements may define the electronic commerce relationship of two or more parties of a value chain, but such agreements may, at times, not directly obligate or otherwise directly involve other VDE value chain participants. For example, an electronic agreement between a content creator and a distributor may establish both the price to the distributor for a creator's content (such as for a property distributed in a VDE container object) and the number of copies of this object that this distributor may distribute to end-users over a given period of time. In a second agreement, a value chain end-user may be involved in a three party agreement in which the end-user agrees to certain requirements for using the distributed product such as accepting distributor charges for content use and agreeing to observe the copyright rights of the creator. A third agreement might exist between the distributor and a financial clearinghouse that allows the distributor to employ the clearinghouse's credit for payment for the product if the end-user has a separate (fourth) agreement directly with the clearinghouse extending credit to the end-user. A fifth, evolving agreement may develop between all value chain participants as content control information passes along its chain of handling. This evolving agreement can establish the rights of all parties to content usage information, including, for example, the nature of information to be received by each party and the pathway of handling of content usage information and related procedures. A sixth agreement in this example, may involve all parties to the agreement and establishes certain general assumptions, such as security techniques and degree of trustedness (for example, commercial integrity of the system may require each VDE installation secure subsystem to electronically warrant that their VDE node meets certain interoperability requirements). In the above example, these six agreements could comprise agreements of an extended agreement for this commercial value chain instance.

Detailed Description Text (9):

For example, the video production studio 204 in the upper right-hand corner of FIG. 1 may create video/television programs. Video production studio 204 may send these programs over lines 202, or may use other paths such as satellite link 205 and CD ROM delivery service 216. Video production studio 204 can send the programs directly to consumers 206, 208, 210, or it can send the programs to information utility 200 which may store and later send them to the consumers, for example. Consumers 206, 208, 210 are each capable of receiving and using the programs created by video production studio 204--assuming, that is, that the video production studio or information utility 200 has arranged for these consumers to have appropriate "rules and controls" (control information) that give the consumers rights to use the programs.

Detailed Description Text (24):

In this FIG. 2 example, information relating to content use is, as shown by arrow 114, reported to a financial clearinghouse 116. Based on this "reporting," the financial clearinghouse 116 may generate a bill and send it to the content user 112 over a "reports and payments" network 118. Arrow 120 shows the content user 112 providing payments for content usage to the financial clearinghouse 116. Based on the reports and payments it receives, the financial clearinghouse 116 may provide reports and/or payments to the distributor 106. The distributor 106 may, as shown by arrow 122, provide reports and/or payments to the content creator 102. The clearinghouse 116 may provide reports and payments directly to the creator 102. Reporting and/or payments may be done differently. For example, clearinghouse 116 may directly or through an agent, provide reports and/or payments to each of VDE content creators 102, and rights distributor 106, as well as reports to content user 112.

Detailed Description Text (30):

"Rules and controls" may self limit if and how they may be changed. Often, "rules and controls" specified by one VDE participant cannot be changed by another VDE participant. For example, a content user 112 generally can't change "rules and controls" specified by a distributor 106 that require the user to pay for content usage at a certain rate. "Rules and controls" may "persist" as they pass through a "chain of handling and control," and may be "inherited" as they are passed down from one VDE participant to the next.

Detailed Description Text (36):

The virtual distribution environment 100 also allows payment and reporting means to be delivered separately. For example, the content user 112 may have a virtual "credit card" that extends credit (up to a certain limit) to pay for usage of any content. A "credit transaction" can take place at the user's site without requiring any "online" connection or further authorization. This invention can be used to help securely protect the virtual "credit card" against unauthorized use.

Detailed Description Text (39):

The "events process" 402 detects things that happen ("events") and determines which of those "events" need action by the other "processes." The "events" may include, for example, a request to use content or generate a usage permission. Some events may need additional processing, and others may not. Whether an "event" needs more processing depends on the "rules and controls" corresponding to the content. For example, a user who lacks permission will not have her request satisfied ("No Go"). As another example, each user request to turn to a new page of an electronic book may be satisfied ("Go"), but it may not be necessary to meter, bill or budget those requests. A user who has purchased a copy of a novel may be permitted to open and read the novel as many times as she wants to without any further metering, billing or budgeting. In this simple example, the "event process" 402 may request metering, billing and/or budgeting processes the first time the user asks to open the protected novel (so the purchase price can be charged to the user), and treat all

later requests to open the same novel as "insignificant events." Other content (for example, searching an electronic telephone directory) may require the user to pay a fee for each access.

Detailed Description Text (40):

"Meter" process 404 keeps track of events, and may report usage to distributor 106 and/or other appropriate VDE participant(s). FIG. 4 shows that process 404 can be based on a number of different factors such as: (a) type of usage to charge for, (b) what kind of unit to base charges on, (c) how much to charge per unit, (d) when to report, and (e) how to pay.

Detailed Description Text (56):

SPU 500 in this example is an integrated circuit ("IC") "chip" 504 including "hardware" 506 and "firmware" 508. SPU 500 connects to the rest of the electronic appliance through an "appliance link" 510. SPU "firmware" 508 in this example is "software" such as a "computer program(s)" "embedded" within chip 504. Firmware 508 makes the hardware 506 work. Hardware 506 preferably contains a processor to perform instructions specified by firmware 508. "Hardware" 506 also contains long-term and short-term memories to store information securely so it can't be tampered with. SPU 500 may also have a protected clock/calendar used for timing events. The SPU hardware 506 in this example may include special purpose electronic circuits that are specially designed to perform certain processes (such as "encryption" and "decryption") rapidly and efficiently.

Detailed Description Text (60):

Electronic appliance 600 in this example may include a keyboard or keypad 612, a voice recognizer 613, and a display 614. A human user can input commands through keyboard 612 and/or voice recognizer 613, and may view information on display 614. Appliance 600 may communicate with the outside world through any of the connections/devices normally used within an electronic appliance. The connections/devices shown along the bottom of the drawing are examples: a "modem" 618 or other telecommunications link; a CD ROM disk 620 or other storage medium or device; a printer 622; broadcast reception 624; a document scanner 626; and a "cable" 628 connecting the appliance with a "network."

Detailed Description Text (70):

In the example shown, I/O controller 660 is connected to secondary storage device 652, a keyboard/display 612, 614, a communications controller 666, and a backup storage device 668. Backup storage device 668 may, for example, store information on mass media such as a tape 670, a floppy disk, a removable memory card, etc. Communications controller 666 may allow electronic appliance 600 to communicate with other electronic appliances via network 672 or other telecommunications links. Different electronic appliances 600 may interoperate even if they use different CPUs and different instances of ROS 602, so long as they typically use compatible communication protocols and/or security methods. In this example, I/O controller 660 permits CPU 654 and SPU 500 to read from and write to secondary storage 662, keyboard/display 612, 614, communications controller 666, and backup storage device 668.

Detailed Description Text (75):

Each VDE node or other electronic appliance 600 in the preferred embodiment may include one or more SPUs 500. SPUs 500 may be used to perform all secure processing for VDE 100. For example, SPU 500 is used for decrypting (or otherwise unsecuring) VDE protected objects 300. It is also used for managing encrypted and/or otherwise secured communication (such as by employing authentication and/or error-correction validation of information). SPU 500 may also perform secure data management processes including governing usage of, auditing of, and where appropriate, payment for VDE objects 300 (through the use of prepayments, credits, real-time electronic debits from bank accounts and/or VDE node currency token deposit accounts). SPU 500 may perform other transactions related to such VDE objects 300.

Detailed Description Text (111):

Bus interface unit (BIU) 530 communicates information between SPU 500 and the outside world across the security barrier 502. BIU 530 shown in FIG. 9 plus appropriate driver software may comprise the "appliance link" 510 shown in FIG. 6. Bus interface unit 530 may be modelled after a USART or PCI bus interface in the preferred embodiment. In this example, BIU 530 connects SPU 500 to electronic appliance system bus 653 shown in FIG. 8. BIU 530 is designed to prevent unauthorized access to internal components within SPU 500 and their contents. It does this by only allowing signals associated with an SPU 500 to be processed by control programs running on microprocessor 520 and not supporting direct access to the internal elements of an SPU 500.

Detailed Description Text (150):

ROS 602 supports multiple processors. ROS 602 in the preferred embodiment supports any number of local and/or remote processors. Supported processors may include at least two types: one or more electronic appliance processors 654, and/or one or more SPUs 500. A host processor CPU 654 may provide storage, database, and communications services. SPU 500 may provide cryptographic and secured process execution services. Diverse control and execution structures supported by ROS 602 may require that processing of control information occur within a controllable execution space---this controllable execution space may be provided by SPU 500. Additional host and/or SPU processors may increase efficiencies and/or capabilities. ROS 602 may access, coordinate and/or manage further processors remote to an electronic appliance 600 (e.g., via network or other communications link) to provide additional processor resources and/or capabilities.

Detailed Description Text (199):

ROS 602 generates component assemblies 690 in a secure manner. As shown graphically in FIGS. 11I and 11J, the different elements comprising a component assembly 690 may be "interlocking" in the sense that they can only go together in ways that are intended by the VDE participants who created the elements and/or specified the component assemblies. ROS 602 includes security protections that can prevent an unauthorized person from modifying elements, and also prevent an unauthorized person from substituting elements. One can picture an unauthorized person making a new element having the same "shape" as the one of the elements shown in FIGS. 11D-11H, and then attempting to substitute the new element in place of the original element. Suppose one of the elements shown in FIG. 11H establishes the price for using content within a VDE object 300. If an unauthorized person could substitute her own "price" element for the price element intended by the VDE content distributor, then the person could establish a price of zero instead of the price the content distributor intended to charge. Similarly, if the element establishes an electronic credit card, then an ability to substitute a different element could have disastrous consequences in terms of allowing a person to charge her usage to someone else's (or a non-existent) credit card. These are merely a few simple examples demonstrating the importance of ROS 602 ensuring that certain component assemblies 690 are formed in a secure manner. ROS 602 provides a wide range of protections against a wide range of "threats" to the secure handling and execution of component assemblies 690.

Detailed Description Text (360):

If External Services Manager 772 is used to access VDE objects, many different techniques are possible. For example, the VDE objects may be formatted for use with the World Wide Web protocols (HTML, HTTP, and URL) by including relevant headers, content tags, host ID to URL conversion (e.g., using Name Services Manager 752) and an HTTP-aware instance of Services Transport Layer 786.

Detailed Description Text (378):

Communications subsystem 776, as discussed above, may be a conventional communications service that provides a network manager 780 and a mail gateway

manager 782. Mail filters 784 may be provided to automatically route objects 300 and other VDE information to/from the outside world. Communications subsystem 776 may support a real time content feed 684 from a cable, satellite or other telecommunications link.

Detailed Description Text (447):

The channel services manager 562 may be passed an identification of the event (e.g., the "event code"). The channel services manager 562 parses one or more method cores 1000' that are part of the component assembly(ies) 690 the channel services manager is to assemble. It performs this parsing to determine which method (s) and data structure(s) are invoked by the type of event. Channel manager 562 then issues calls (e.g., to secure database manager 566) to obtain the methods and data structure(s) needed to build the component assembly 690. These called-for method(s) and data structure(s) (e.g., load modules 1100, UDEs 1200 and/or MDEs 1202) are each decrypted using encrypt/decrypt manager 556 (if necessary), and are then each validated using key and tag manager 558. Channel manager 562 constructs any necessary "jump table" references to, in effect, "link" or "bind" the elements into a single cohesive executable so the load module(s) can reference data structures and any other load module(s) in the component assembly. Channel manager 562 may then issue calls to LMEM 568 to load the executable as an active task.

Detailed Description Text (449):

"Channel header" 596 in the preferred embodiment is (or references) the data structure(s) and associated control program(s) that queues events from channel event sources, processes these events, and releases the appropriate tasks specified in the "channel detail record" for processing. A "channel detail record" in the preferred embodiment links an event to a "swap block" (i.e., task) associated with that event. The "swap block" may reference one or more load modules 1100, UDEs 1200 and private data areas required to properly process the event. One swap block and a corresponding channel detail item is created for each different event the channel can respond to.

Detailed Description Text (535):

The "out of channel" distribution may also allow the provider to receive payment for usage and/or otherwise maintain at least a degree of control over the redistributed object. Such certain criteria might involve, for example, the registered presence at a user's VDE node of an authorized third party financial relationship, such as a credit card, along with sufficient available credit for said usage.

Detailed Description Text (540):

The methods 1000 contained by a traveling object will typically include an installation procedure for "self registering" the object using the permission records 808 in the object (e.g., a REGISTER method). This may be especially useful for objects that have time limited value, objects (or properties) for which the end user is either not charged or is charged only a nominal fee (e.g., objects for which advertisers and/or information publishers are charged based on the number of end users who actually access published information), and objects that require widely available budget and may particularly benefit from out-of-channel distribution (e.g., credit card derived budgets for objects containing properties such as movies, software programs, games, etc.). Such traveling objects may be supplied with or without contained budget UDEs.

Detailed Description Text (608):

A further example of a map meter includes stoning a record of all applicable atomic elements that the user has paid to use (or alternatively, has been metered as having used, though payment may not yet have been required or made). Such a usage map would support a very efficient and flexible way to allow subsequent user usage of the same atomic elements.

Detailed Description Text (741):

Control of event processing, reciprocal events, and their associated methods and method components is provided by PERCs 808 in the preferred embodiment. These PERCs (808) might reference administrative methods that govern the creation, modification, and distribution of the data structures and administrative methods that permit access, modification, and further distribution of these items. In this way, each link in the chain of handling and control might, for example, be able to customize audit information, alter the budget requirements for using the content, and/or control further distribution of these rights in a manner specified by prior members along the distribution chain.

Detailed Description Text (761):

The steps shown in FIG. 43a may be, for example, performed at a user VDE node in response to some action by or on behalf of the user. For example the user may ask to access an object that has not yet been (or is not now) properly registered to her. In response to such a user request, the REGISTER method 2400 may prime a Register Audit Trail UDE (blocks 2402, 2404) before determining whether the object being requested has already been registered (decision block 2406). If the object has already been registered ("yes" exit to decision block 2406), the REGISTER method may terminate (at termination point 2408). If the object is not already registered ("no" exit to decision block 2406), then REGISTER method 2400 may access the VDE node secure database PERC 808 and/or Register MDE (block 2410). REGISTER method 2400 may extract an appropriate Register Record Set from this PERC 808 and/or Register MDE (block 2412), and determine whether all of the required elements are present that are needed to register the object (decision block 2414). If some piece(s) is missing ("no" exit to decision block 2414), REGISTER method 2400 may queue a Register request record to a communication manager and then suspend the REGISTER method until the queued request is satisfied (blocks 2416, 2418). Block 2416 may have the effect of communicating a register request to a VDE distributor, for example. When the request is satisfied and the register request record has been received (block 2420), then the test of decision block 2414 is satisfied ("yes" exit to decision block 2414), and REGISTER method 2400 may proceed. At this stage, the REGISTER method 2400 may allow the user to select Register options from the set of method options allowed by PERC 808 accessed at block 2410 (block 2422). As one simple example, the PERC 808 may permit the user to pay by VISA or MasterCard but not by American Express; block 2422 may display a prompt asking the user to select between paying using her VISA card and paying using her MasterCard (block 2424). The REGISTER method 2400 preferably validates the user selected registration options and requires the user to select different options if the initial user options were invalid (block 2426, "no" exit to decision block 2428). Once the user has made all required registration option selections and those selections have been validated ("yes" exit to decision block 2428), the REGISTER method 2400 may write an User Registration Table (URT) corresponding to this object and this user which embodies the user registration selections made by the user along with other registration information required by PERC 808 and/or the Register MDE (blocks 2430, 2432). REGISTER method 2400 may then write a Register audit record into the secure database (blocks 2432, 2434) before terminating (at terminate point 2436).

Detailed Description Text (776):

In addition, the preferred embodiment provides an optimization called "precheck." EVENT method/process 402 may perform this "precheck" based on metering, billing and budget information to determine whether processing based on an event will be allowed. Suppose, for example, that the user has already exceeded her budget with respect to accessing certain information content so that no further access is permitted. Although BUDGET method 408 could make this determination, records and processes performed by BUDGET method 404 and/or BILLING method 406 might have to be "undone" to, for example, prevent the user from being charged for an access that was actually denied. It may be more efficient to perform a "precheck" within EVENT method 402 so that fewer transactions have to be "undone."

Detailed Description Text (800):

Assuming the proper URT for this user and object is present such that the object is registered for this user ("yes" exit to decision block 1522), control method 1502 may determine whether the object is already open for this user (decision block 1528). This test may avoid creating a redundant channel for opening an object that is already open. Assuming the object is not already open ("no" exit to decision block 1528), control method 1502 creates a channel and binds appropriate open control elements to it (block 1530). It reads the appropriate open control elements from the secure database (or the container, such as, for example, in the case of a travelling object), and "binds" or "links" these particular appropriate control elements together in order to control opening of the object for this user. Thus, block 1530 associates an event with one or more appropriate method core(s), appropriate load modules, appropriate User Data Elements, and appropriate Method Data Elements read from the secure database (or the container) (block 1532). At this point, control method 1502 specifies the open event (which started the OPEN method to begin with), the object ID and user ID (determined by block 1520), and the channel ID of the channel created by block 1530 to subsequent EVENT method 1504, METER method 1506, BILLING method 1508 and BUDGET method 1510 to provide a secure database "transaction" (block 1536). Before doing so, control method 1502 may prime an audit process (block 1533) and write audit information into an audit UDE (block 1534) so a record of the transaction exists even if the transaction fails or is interfered with.

Detailed Description Text (1048):

Finally, the end-to-end nature of VDE applications, in which content 108 flows in one direction, generating reports and bills 118 in the other, makes it possible to perform "back-end" consistency checks. Such checks, performed in clearinghouses 116, can detect patterns of use that may or do indicate fraud (e.g., excessive acquisition of protected content without any corresponding payment, usage records without corresponding billing records). The fine grain of usage reporting and the ready availability of usage records and reports in electronic form enables sophisticated fraud detection mechanisms to be built so that fraud-related costs can be kept to an acceptable level.

Detailed Description Text (1111):

The portable appliance 2600 or other VDE electronic appliance 600, can, in one embodiment, also automate many tax collection functions. A VDE electronic appliance 600 may, with great security, record financial transactions, identify the nature of the transaction, and identify the required sales or related government transaction taxes, debit the taxes from the users available credit, and securely communicate this information to one or more government agencies directly at some interval (for example monthly), and/or securely transfer this information to, for example, a financial clearinghouse, which would then transfer one or more secure, encrypted (or unsecure, calculated by clearinghouse, or otherwise computed) information audit packets (e.g., VDE content containers and employing secure VDE communication techniques) to the one or more appropriate, participating government agencies. The overall integrity and security of VDE 100 could ensure, in a coherent and centralized manner, that electronic reporting of tax related information (derived from one or more electronic commerce activities) would be valid and comprehensive. It could also act as a validating source of information on the transfer of sales tax collection (e.g., if, for example, said funds are transferred directly to the government by a commercial operation and/or transferred in a manner such that reported tax related information cannot be tampered with by other parties in a VDE pathway of tax information handling). A government agency could select transactions randomly, or some subset or all of the reported transactions for a given commercial operation can be selected. This could be used to ensure that the commercial operation is actually paying to the government all appropriate collected finds required for taxes, and can also ensure that end-users are charged appropriate taxes for their transactions (including receipt of interest from bank accounts,

investments, gifts, etc.

Detailed Description Text (1128):

These significant problems in using software agents have not be adequately addressed in the past. The open, flexible control structures provided by VDE 100 addresses these problems by providing the desired control and accountability for software agents (e.g., agent objects). For example, VDE 100 positively controls content access and usage, provides guarantee of payment for content used, and enforces budget limits for accessed content. These control capabilities are well suited to controlling the activities of a dispatched agent by both the process that dispatches the agent and the resource accessed by the dispatched agent.

Detailed Description Text (1141):

4. A right to have information returned to the user without charge (charges to be incurred on release of information and payment will be by a VISA budget)

Detailed Description Text (1180):

FIG. 75E shows a more high-level view of an electronic contract 3200 formed as a "result" of a negotiation process as described above. Electronic contract 3200 may include multiple clauses 3202 and multiple digital signatures 3204. Each clause 3202 may comprise a PERC/URT such as item 3160 described above and shown in FIG. 75D. Each "clause" 3202 of electronic contract 3200 thus corresponds to a component assembly 690 that may be assembled and executed by a VDE electronic appliance 600. Just as in normal contracts, there may be as many contract clauses 3202 within electronic contract 3200 as is necessary to embody the "agreement" between the "parties." Each of clauses 3202 may have been electronically negotiated and may thus embody a part of the "agreement" (e.g., a "compromise") between the parties. Electronic contract 3200 is "self-executing" in the sense that it may be literally executed by a machine, i.e., a VDE electronic appliance 600 that assembles component assemblies 690 as specified by various electronic clauses 3202. Electronic contract 3200 may be automatically "enforced" using the same VDE mechanisms discussed above that are used in conjunction with any component assembly 690. For example, assuming that a clause 3202(2) corresponds to a payment or BILLING condition or term, its corresponding component assembly 690 when assembled by a user's VDE electronic appliance 600 may automatically determine whether conditions are right for payment and, when they are, automatically access an appropriate payment mechanism (e.g., a virtual "credit card" object for the user) to arrange that payment to be made. As another example, assuming that electronic contract clause N 3202(N) corresponds to a user's obligation to provide auditing information to a particular VDE participant, electronic contract 3200 will cause VDE electronic appliance 600 to assemble a corresponding component assembly 690 that may, for example, access the appropriate audit trails within secure database 610 and provide them in an administrative object to the correct participant. FIG. 75F shows that clause 3202(N) may, for example, specify a component assembly 690 that arranges for multiple steps in a transaction 3206 to occur. Some of these steps (e.g., step 3208(4), 3208(5)) may be conditional on a test (e.g., 3208(3)) such as, for example, whether content usage has exceeded a certain amount, whether a certain time period has expired, whether a certain calendar date has been reached, etc.

Detailed Description Text (1199):

In "trusted negotiator" negotiations, all parties provide their demands and preferences to a "trusted" negotiator and agree to be bound by her decision. This is similar to binding arbitration in today's society. VDE enables this mode of negotiation by providing an environment in which a "trusted" negotiation service may be created. VDE provides not only the mechanism by which demands, desires, and limits may be concisely specified (e.g., in PERCs), but in which the PERCs may be securely transferred to a "trusted" negotiation service along with a rule set that specifies how the negotiation will be conducted, and by providing a secure execution environment so that the negotiation process may not be tampered with.

Trusted negotiator services can be used at VDE sites where the integrity of the site is well known. Remote trusted negotiation services can be used by VDE sites that do not possess sufficient computing resources to execute one or more negotiation process(es); they can establish a communication link to a VDE site that provides this service and permits the service to handle the negotiation on their behalf. "Zero-based" knowledge negotiations share some characteristics of the zero-based knowledge protocols used for authentication. It is well understood in the art how to construct a protocol that can determine if a remote site is the holder of a specific item without exchanging or exposing the item. This type of protocol can be constructed between two negotiation processes operating on at least one VDE site using a control set as their knowledge base. The negotiation processes may exchange information about their control sets, and may make demands and counter proposals regarding using their individual rule sets. For example, negotiation process A may communicate with negotiation process B to negotiate rights to read a book. Negotiation process A specifies that it will pay not more than \$10.00 for rights to read the book, and prefers to pay between \$5.00 and \$6.00 for this right. Process A's rule set also specifies that for the \$5.00 option, it will permit the release of the reader's name and address. Process B's rule set specifies that it wants \$50.00 for rights to read the book, and will provide the book for \$5.50 if the user agrees to release information about himself. The negotiation might go something like this:

Detailed Description Text (1205):

To open a VDE package and make use of its content, an enduser must have permission. Distributors 106 can grant these permissions, and can very flexibly (if permitted by senior control information) limit or otherwise specify the ways in which package contents may be used. Distributors 106 and financial clearinghouses 116 also typically have financial responsibilities (they may be the same organization in some circumstances if desired). They ensure that any payments required from end-users fulfill their own and any other participant's requirements. This is achieved by auditing usage.

Detailed Description Text (1215):

Independent financial providers can play an important role in VDE 100. The VDE financial provider role is similar to the role played by organizations such as VISA in traditional distribution scenarios. In any distribution model, authorizing payments for use of products or services and auditing usage for consistency and irregularities, is critical. In VDE 100, these are the roles filled by independent financial providers. The independent financial providers may also provide audit services to content providers. Thus, budgets or limits on use, and audits, or records of use, may be processed by (and may also be put in place by) clearinghouses 116, and the clearinghouses may then collect usage payments from users 112. Any VDE user 112 may assign the right to process information or perform services on their behalf to the extent allowed by senior control information. The arrangement by which one VDE participant acts on behalf of another is called a "proxy." Audit, distribution, and other important rights may be "proxied" if permitted by the content provider. One special type of "proxy" is the VDE administrator 116b. A VDE administrator is an organization (which may be acting also as a financial clearinghouse 116) that has permission to manage (for example, "intervene" to reset) some portion or all of VDE secure subsystem control information for VDE electronic appliances. This administration right may extend only to admitting new appliances to a VDE infrastructure and to recovering "crashed" or otherwise inoperable appliances, and providing periodic VDE updates.

Detailed Description Text (1220):

The content of an object 300 created by an author may be generated with the assistance of a VDE aware application program or a non-VDE aware application program. The content of the object created by an author in conjunction with such programs may include text, formatted text, pictures, moving pictures, sounds, computer software, multimedia, electronic games, electronic training materials,

various types of files, and so on, without limitation. The authoring process may encapsulate content generated by the author in an object, encrypt the content with one or more keys, and append one or more methods to define parameters of allowed use and/or required auditing of use and/or payment for use of the object by users (and/or by authorized users only). The authoring process may also include some or all aspects of distributing the object.

Detailed Description Text (1223):

A VDE node electronic appliance 600 may receive and process audit records on behalf of an object provider if that VDE node receives any necessary administrative budget, audit method, and audit key information (used, for example, to decrypt audit trails), from the object provider. An auditing-capable VDE electronic appliance 600 may control execution of audit reduction methods. "Audit reduction" in the preferred embodiment is the process of extracting information from audit records and/or. processes that an object provider (e.g., any object provider along a chain of handling of the object) has specified to be reported to an object's distributors, object creators, client administrators, and/or any other user of audit information. This may include, for example, advertisers who may be required to pay for a user's usage of object content. In one embodiment, for example, a clearinghouse can have the ability to "append" budget, audit method, and/or audit key information to an object or class or other grouping of objects located at a user site or located at an object provider site to ensure that desired audit processes will take place in a "trusted" fashion. A participant in a chain of handling of a VDE content container and/or content container control information object may act as a "proxy" for another party in a chain of handling of usage auditing information related to usage of object content (for example a clearinghouse, an advertiser, or a party interested in market survey and/or specific customer usage information). This may be done by specifying, for that other party, budget, audit method, and/or key information that may be necessary to ensure audit information is gathered and/or provided to, in a proper manner, said additional party. For example, employing specification information provided by said other party.

Detailed Description Text (1271):

Distribution involves three types of entity. Creators usually are the source of distribution. They typically set the control structure "context" and can control the rights which are passed into a distribution network. Distributors are users who form a link between object (content) end users and object (content) creators. They can provide a two-way conduit for rights and audit data. Clearinghouses may provide independent financial services, such as credit and/or billing services, and can serve as distributors and/or creators. Through a permissions and budgeting process, these parties collectively can establish fine control over the type and extent of rights usage and/or auditing activities.

Detailed Description Text (1273):

An "encumbrance" is a special type of VDE budget. When that a budget distribution of any type occurs, an "encumbrance" may be generated. An encumbrance is indistinguishable from an original budget for right exercise (e.g., content usage payment) purposes, but is uniquely identified within distribution records as to the amount of the encumbrance, and all necessary information to complete a shipping record to track the whereabouts of an encumbrance. For right exercise purposes, an encumbrance is identical to an original budget; but for tracking purposes, it is uniquely identifiable.

Detailed Description Text (1288):

A content creator or other content control information provider may budget a user (such as a distributor) to create an unlimited number of permissions records for a content object, but revoke this right and/or other important usage rights through an expiration/termination process if the user does not report his usage (provide an audit report) at some expected one or more points in time and/or after a certain

interval of time (and/or if the user fails to pay for his usage or violates other aspects of the agreement between the user and the content provider). This termination (or suspension or other specified consequence) can be enforced, for example, by the expiration of time-aged encryption keys which were employed to encrypt one or more aspects of control information. This same termination (or other specified consequence such as budget reduction, price increase, message displays on screen to users, messages to administrators, etc.) can also be the consequence of the failure by a user or the users VDE installation to complete a monitored process, such as paying for usage in electronic currency, failure to perform backups of important stored information (e.g., content and/or appliance usage information, control information, etc.), failure to use a repeated failure to use the proper passwords or other identifiers, etc.).

Detailed Description Text (1294):

An important function of an auditor (receiver of audit information) is to pass administrative events back to a user VDE node in acknowledgement that audit information has been received and/or "recognized." In the preferred embodiment, the receipt and/or acceptance of audit information may be followed by two processes. The first event will cause the audit data at a VDE node which prepared an audit report to be deleted, or compressed into, or added to, one or more summary values. The second event, or set of events, will "inform" the relevant security (for example, termination and/or other consequence) control information (for example, budgets) at said VDE node of the audit receipt, modify expiration dates, provide key updates, and/or etc. In most cases, these events will be sent immediately to a site after an audit trail is received. In some cases, this transmission may be delayed to, for example, first allow processing of the audit trail and/or payment by a user to an auditor or other party.

Detailed Description Text (1312):

Research can be automatically managed using VDE. Smart objects can be, used to securely search out, pay for if necessary, and retrieve information from VDE enabled information resources on the information highway.

Detailed Description Text (1313):

Examples of such resources might include LEXIS, Westlaw, and other related legal databases. Once the information is retrieved, it may be securely embedded in the VDE content client container. If the smart object still contains unreleased information, the entire smart object may be embedded in the client's VDE container. This places the unreleased information under double VDE control requirements: those associated with releasing the information from smart object (such as payment and/or auditing requirements) and those associated with access to, or other usage of, client information of the specified type.

Detailed Description Text (1345):

As the "Digital Highway" emerges, there is increased discussion concerning the distribution of content across networks and, in particular, public networks such as the Internet. Content may be made available across public networks in several ways including: "mailing" content to a user in response to a request or advance purchase (sending a token representing the commitment of electronic funds or credit to purchase an item); supporting content downloadable from an organization's own content repository, such a repository comprising, for example, a store of products (such as software programs) and/or a store of information resources, normally organized into one or more databases; and supporting a public repository into which other parties can deposit their products for redistribution to customers (normally by making electronic copies for distribution to a customer in response to a request).

Detailed Description Text (1348):

VDE repositories may also offer other VDE services. For example, a repository may choose to offer financial services in the form of credit from the repository that

may be used to pay fees associated with use of VDE objects obtained from the repository. Alternatively or in addition, a VDE repository may perform audit information clearinghouse services on behalf of VDE creators or other participants (e.g. distributors, redistributors, client administrators, etc.) for usage information reported by VDE users. Such services may include analyzing such usage information, creating reports, collecting payments, etc.

Detailed Description Text (1349):

A "full service" VDE repository may be very attractive to both providers and users of VDE managed content. Providers of VDE managed content may desire to place their content in a location that is well known to users, offers credit, and/or performs audit services for them. In this case, providers may be able to focus on creating content, rather than managing the administrative processes associated with making content available in a "retail" fashion, collecting audit information from many VDE users, sending and receiving bills and payments, etc. VDE users may find the convenience of a single location (or an integrated arrangement of repositories) appealing as they are attempting to locate content of interest. In addition, a full service VDE repository may serve as a single location for the reporting of usage information generated as a consequence of their use of VDE managed content received from a VDE repository and/or, for example, receiving updated software (e.g. VDE-aware applications, load modules, component assemblies, non VDE-aware applications, etc.) VDE repository services may be employed in conjunction with VDE content delivery by broadcast and/or on physical media, such as CD-ROM, to constitute an integrated array of content resources that may be browsed, searched, and/or filtered, as appropriate, to fulfill the content needs of VDE users.

Detailed Description Text (1358):

The repository 3302 receives the completed registration information from author 3306A and uses this information to build an account profile for author 3306A. In addition, software associated with the authoring process may be transmitted to author 3306A. This software may, for example, allow author 3306A to place content into a VDE content container with appropriate controls in such a way that many of the decisions associated with creating such containers are made automatically to reflect the use of the repository 3302 as a content system and/or a clearinghouse system (for example, the location of content, the party to contact for updates to content and/or controls associated with content, the party or parties to whom audit information may and/or must be transmitted and the pathways for such communication, the character of audit information that is collected during usage, the forms of payment that are acceptable for use of content, the frequency of audit transmissions required, the frequency of billing, the form of abstract and/or other identifying information associated with content, the nature of at least a portion of content usage control information, etc.)

Detailed Description Text (1363):

One factor in a potentially ongoing financial relationship between the repository and author 3306A may relate to usage of submitted content by end users 3310. For example, author 3306A may negotiate an arrangement with the repository wherein the repository is authorized to keep 20% of the total revenues generated from end users 3310 in exchange for maintaining the repository services (e.g. making content available to end users 3310, providing electronic credit, performing billing activities, collecting fees, etc.) A financial relationship may be recorded in control structures in flexible and configurable ways. For example, the financial relationship described above could be created in a VDE container and/or installation control structure devised by author 3306A to reflect author 3306A's financial requirements and the need for a 20% split in revenue with the repository wherein all billing activities related to usage of submitted content could be processed by the repository, and control structures representing reciprocal methods associated with various component assemblies required for use of author 3306A's submitted content could be used to calculate the 20% of revenues. Alternatively, the repository may independently and securely add and/or modify control structures

originating from author 3306A in order to reflect an increase in price. Under some circumstances, author 3306A may not be directly involved (or have any knowledge of) the actual price that the repository charges for usage activities, and may concern herself only with the amount of revenue and character of usage analysis information that she requires for her own purposes, which she specifies in VDE control information which governs the use, and consequences of use, of VDE controlled content.

Detailed Description Text (1369):

In order to provide a manageable user interface to the content available to VDE repository end users 3310 and to provide administrative information used in the determination of control information packaged in VDE content containers shipped to end users 3310, the repository in this example includes a content catalog 3322. This catalog is used to record information related to the VDE content in content storage, and/or content available through the repository reflected in content references. The content catalog 3322 may consist of titles of content, abstracts, and other identifying information. In addition, the catalog may also indicate the forms of electronic agreement and/or agreement VDE template applications (offering optional, selectable control structures and/or one or more opportunities to provide related parameter data) that are available to end users 3310 through the repository for given pieces of content in deciding, for example, options and/or requirements for: what type(s) of information is recorded during such content's use, the charge for certain content usage activities, differences in charges based on whether or not certain usage information is recorded and/or made available to the repository and/or content provider, the redistribution rights associated with such content, the reporting frequency for audit transmissions, the forms of credit and/or currency that may be used to pay certain fees associated with use of such content, discounts related to certain volumes of usage, discounts available due to the presence of rights associated with other content from the same and/or different content providers, sales, etc. Furthermore, a VDE repository content catalog 3322 may indicate some or all of the component assemblies that are required in order to make use of content such that the end user's system and the repository can exchange messages to help ensure that any necessary VDE component assemblies or other VDE control information is identified, and if necessary and authorized, are delivered along with such content to the end user (rather than, for example, being requested later after their absence has been detected during a registration and/or use attempt).

Detailed Description Text (1375):

An end user may make use of credit and/or currency securely stored within the end user's VDE installation secure subsystem to pay for charges related to use of VDE content received from the repository, and/or the user may maintain a secure credit and/or currency account remotely at the repository including a "virtual" repository where payment is made for the receipt of such content by an end user. This later approach may provide greater assurance for payment to the repository and/or content providers particularly if the end user has only an HPE based secure subsystem. If an end user electronic credit and/or currency account is maintained at the repository in this example, charges are made to said account based on end user receipt of content from the repository. Further charges to such a remote end user account may be made based on end user usage of such received content and based upon content usage information communicated to the repository clearinghouse system 3302B.

Detailed Description Text (1376):

In this example, if an end user does not have a relationship established with a financial provider (who has authorized the content providers whose content may be obtained through use of the repository to make use of their currency and/or credit to pay for any usage fees associated with such provider's content) and/or if an end user desires a new source of such credit, the end user may request credit from the repository clearinghouse system 3302B. If an end user is approved for credit, the

repository may extend credit in the form of credit amounts (e.g. recorded in one or more UDEs) associated with a budget method managed by the repository. Periodically, usage information associated with such a budget method is transmitted by the end user to the audit system of the repository. After such a transmission (but potentially before the connection is terminated), an amount owing is recorded for processing by the billing system, and in accordance with the repository's business practices, the amount of credit available for use by the end user may be replenished in the same or subsequent transmission. In this example, the clearinghouse of the repository supports a billing system with a paper system for resolving amounts owed through the mail, a credit card system for resolving amounts owed through charges to one or more credit cards, and an electronic funds transfer system for resolving such amounts through direct debits to a bank account. The repository may automatically make payments determined by the disbursement system for monies owed to authors through use of similar means. Additional detail regarding the audit process is provided below.

Detailed Description Text (1379):

Audit information (related to usage of content received from the repository) in this example is securely received from end users 3310 by the receipt system 3362 of the clearinghouse. As indicated above, this system may process the audit information and pass some or all of the output of such a process to the billing system and/or transmit such output to appropriate content authors. Such passing of audit information employs secure VDE pathway of reporting information handling techniques. Audit information may also be passed to the analysis system in order to produce analysis results related to end user content usage for use by the end user, the repository, third party market researchers, and/or one or more authors. Analysis results may be based on a single audit transmission, a portion of an audit transmission, a collection of audit transmissions from a single end user and/or multiple end users 3310, or some combination of audit transmissions based on the subject of analysis (e.g. usage patterns for a given content element or collection of elements, usage of certain categories of content, payment histories, demographic usage patterns, etc.) The response system 3364 is used to send information to the end user to, for example, replenish a budget, deliver usage controls, update permissions information, and to transmit certain other information and/or messages requested and/or required by an end user in the course of their interaction with the clearinghouse. During the course of an end user's connections and transmissions to and from the clearinghouse, certain transactions (e.g. time, date, and/or purpose of a connection and/or transmission) may be recorded by the transaction system of the audit system to reflect requirements of the repository and/or authors.

Detailed Description Text (1380):

Certain audit information may be transmitted to authors. For example, author 3306A may require that certain information gathered from an end user be transmitted to author 3306A with no processing by the audit system. In this case, the fact of the transmission may be recorded by the audit system, but author 3306A may have elected to perform their own usage analysis rather than (or in addition to) permitting the repository to access, otherwise process and/or otherwise use this information. The repository in this example may provide author 3306A with some of the usage information related to the repository's budget method received from one or more end users 3310 and generated by the payment of fees associated with such users' usage of content provided by author 3306A. In this case, author 3306A may be able to compare certain usage information related to content with the usage information related to the repository's budget method for the content to analyze patterns of usage (e.g. to analyze usage in light of fees, detect possible fraud, generate user profile information, etc.) Any usage fees collected by the clearinghouse associated with author 3306A's content that are due to author 3306A will be determined by the disbursement system of the clearinghouse. The disbursement system may include usage information (in complete or summary form) with any payments to author 3306A resulting from such a determination. Such payments and information reporting may be

an entirely automated sequence of processes occurring within the VDE pathway from end user VDE secure subsystems, to the clearinghouse secure subsystem, to the author's secure subsystem.

Detailed Description Text (1381):

In this example, end users 3310 may transmit VDE permissions and/or other control information to the repository 3302 permitting and/or denying access to usage information collected by the audit system for use by the analysis system. This, in part, may help ensure end user's privacy rights as it relates to the usage of such information. Some containers may require, as an aspect of their control structures, that an end user make usage information available for analysis purposes. Other containers may give an end user the option of either allowing the usage information to be used for analysis, or denying some or all such uses of such information. Some users may elect to allow analysis of certain information, and deny this permission for other information. End users 3310 in this example may, for example, elect to limit the granularity of information that may be used for analysis purposes (e.g. an end user may allow analysis of the number of movies viewed in a time period but disallow use of specific titles, an end user may allow release of their ZIP code for demographic analysis, but disallow use of their name and address, etc.) Authors and/or the repository 3302 may, for example, choose to charge end users 3310 smaller fees if they agree to release certain usage information for analysis purposes.

Detailed Description Text (1398):

In this case, a VDE container may be associated with an OLE "link." Accesses (including reading content from, and writing content to) to a VDE protected container may be passed from an OLE aware application to a VDE aware OLE application that accesses protected content in conjunction with control information associated with such content.

Detailed Description Text (1415):

After receiving enabling distribution control information from creator A, distributor A may manipulate an application program to specify some or all of the particulars of usage control information for users and/or user/distributors enabled by distributor A (as allowed, or not prevented, by senior control information). Distributor A may, for example, determine that a price of \$15 per month per user would meet distributor A's business objectives with respect to payments from users for creator A's container. Distributor A must specify usage control information that fulfill the requirements of the distribution control information given to distributor A by creator A. For example, distributor A may include any required expiration dates and/or time-aged encryption keys in the specification of control information in accordance with creator A's requirements. If distributor A failed to include such information (or to meet other requirements) in their specification of control information, the control method(s) referenced in creator A's permissions record and securely invoked within a PPE 650 to actually create this control information would, in this example, fail to execute in the desired way (e.g. based on checks of proposed values in certain fields, a requirement that certain methods be included in permissions, etc.) until acceptable information were included in distributor A's control information specification.

Detailed Description Text (1416):

In this example, user A may have established an account with distributor A such that user A may receive VDE managed content usage control information from distributor A. User A may receive content usage control information from distributor A to access and use creator A's content. Since the usage control information has passed through (and been added to, and/or modified by) a chain of handling including distributor A, the usage control information requested from distributor A to make use of creator A's content will, in this example, reflect a composite of control information from creator A and distributor A. For example, creator A may have established a meter method that will generate an audit record if

a user accesses creator A's VDE controlled content container if the user has not previously accessed the container within the same calendar month (e.g. by storing the date of the user's last access in a UDE associated with an open container event referenced in a method core of such a meter method and comparing such a date upon subsequent access to determine if such access has occurred within the same calendar month). Distributor A may make use of such a meter method in a control method (e.g. also created and/or provided by creator A, or created and/or provided by distributor A) associated with opening creator A's container that invokes one or more billing and/or budget methods created, modified, referenced in one or more permissions records and/or parameterized by distributor A to reflect a charge for monthly usage as described above. If distributor A has specified usage and/or redistribution control information within the boundaries permitted by creator A's senior control information, a new set of control information (shown as D.sub.A (C.sub.A) in FIG. 80) may be associated with creator A's VDE content container when control information associated with that container by distributor A are delivered to users and/or user/distributors (user A, user B, and user/distributor A in this example).

Detailed Description Text (1417):

In this example, user A may receive control information related to creator A's VDE content container from distributor A. This control information may represent an extended agreement between user A and distributor A (e.g. regarding fees associated with use of content, limited redistribution rights, etc.) and distributor A and creator A (e.g. regarding the character, extent, handling, reporting; and/or other aspects of the use and/or creation of VDE controlled content usage information and/or content control information received, for example, by distributor A from creator A, or vice versa, or in other VDE content usage information handling). Such an extended agreement is enforced by processes operating within a secure subsystem of each participant's VDE installation. The portion of such an extended agreement representing control information of creator A as modified by distributor A in this example is represented by D.sub.A (C.sub.A), including, for example, (a) control structures (e.g. one or more component assemblies, one or more permissions records, etc.), (b) the recording of usage information generated in the course of using creator A's content in conformance with requirements stated in such control information, (c) making payments (including automatic electronic credit and/or currency payments "executed" in response to such usage) as a consequence of such usage (wherein such consequences may also include electronically, securely and automatically receiving a bill delivered through use of VDE, wherein such a bill is derived from said usage), (d) other actions by user A and/or a VDE secure subsystem at user A's VDE installation that are a consequence of such usage and/or such control information.

Detailed Description Text (1420):

User/distributor A may, for example, both use creator A's content as a user and act as a redistributor of control information. In this example, control information D.sub.A (C.sub.A) both enables and limits these two activities. To the extent permitted by D.sub.A (C.sub.A), user/distributor A may create their own control information based on D.sub.A (C.sub.A)--UD.sub.A (D.sub.A (C.sub.A))--that controls both user/distributor A's usage (in a manner similar to that described above in connection with user A and user B), and control information redistributed by user/distributor A (in a manner similar to that described above in connection with distributor A). For example, if user/distributor A redistributes UD.sub.A (D.sub.A (C.sub.A)) to user/distributor B, user/distributor B may be required to report certain usage information to user/distributor A that was not required by either creator A or distributor A. Alternatively or in addition, user/distributor B may, for example, agree to pay user/distributor A a fee to use creator A's content based on the number of minutes user/distributor B uses creator A's content (rather than the monthly fee charged to user/distributor A by distributor A for user/distributor B's usage).

Detailed Description Text (1422):

As indicated in FIG. 79, user B may employ content from both user/distributor B and distributor A (amongst others). In this example, as illustrated in FIG. 80, user B may receive control information associated with creator A's content from distributor A and/or user/distributor B. In either case, user B may be able to establish their own control information on D.sub.A (C.sub.A) and/or UD.sub.B (UD.sub.A (D.sub.A (C.sub.A))), respectively (if allowed by such control information. The resulting set(s) of control information, U.sub.B (D.sub.A (C.sub.A)) and/or U.sub.B (UD.sub.B (UD.sub.A (D.sub.A (C.sub.A)))) respectively, may represent different control scenarios, each of which may have benefits for user B. As described in connection with an earlier example, user B may have received control information from user/distributor B along a chain of handling including user/distributor A that bases fees on the number of minutes that user B makes use of creator A's content (and requiring user/distributor A to pay fees of \$15 per month per user to distributor A regardless of the amount of usage by user B in a calendar month). This may be more favorable under some circumstances than the fees required by a direct use of control information provided by distributor A, but may also have the disadvantage of an exhausted chain of redistribution and, for example, further usage information reporting requirements included in UD.sub.B (UD.sub.A (D.sub.A (C.sub.A))). If the two sets of control information D.sub.A (C.sub.A) and UD.sub.B (UD.sub.A (D.sub.A (C.sub.A))) permit (e.g. do not require exclusivity enforced, for example, by using a registration interval in an object registry used by a secure subsystem of user B's VDE installation to prevent deregistration and reregistration of different sets of control information related to a certain container (or registration of plural copies of the same content having different control information and/or being supplied by different content providers) within a particular interval of time as an aspect of an extended agreement for a chain of handling and control reflected in D.sub.A (C.sub.A) and/or UD.sub.B (UD.sub.A (D.sub.A (C.sub.A)))), user B may have both sets of control information registered and may make use of the set that they find preferable under a given usage scenario.

Detailed Description Text (1424):

In this example, distributor A may request control information from creator B that enables distributor A to distribute control information to users and/or user/distributors that is associated with the VDE container described above in connection with creator B. As stated earlier, distributor A has established a business model that favors "rental" of access rights to users and user/distributors receiving such rights from distributor A. Creator B's distribution control information in this example does not force a model including "rental" of rights, but rather bases payment amounts on the quantity of content decrypted by a user or user/distributor. In this example, distributor A may use VDE to negotiate with creator B to include a different usage information recording model allowed by creator B. This model may be based on including one or more meter methods in control structures associated with creator B's container that will record the number of bytes decrypted by end users, but not charge users a fee based on such decryptions; rather distributor A proposes, and creator B's control information agrees to allow, a "rental" model to charge users, and determines the amount of payments to creator B based on information recorded by the bytes decrypted meter methods and/or collections of payment from users.

Detailed Description Text (1426):

User A may receive a set of control information D.sub.A (C.sub.B) from distributor A. As indicated above in connection with content received from creator A via a chain of handling including distributor A, user A may apply their own control information to the control information D.sub.A (C.sub.B), to the extent permitted by D.sub.A (C.sub.B), to produce a set of control information U.sub.A (D.sub.A (C.sub.B)). The set of control information D.sub.A (C.sub.B) may include one or more meter methods that record the number of bytes of content from creator B's container decrypted by user A (in order to allow correct calculation of amounts

owed by distributor A to creator B for user A's usage of creator B's content in accordance with the control information of C.sub.B that requires payment of \$0.50 per kilobyte of decrypted information), and a further meter method associated with recording usage such that distributor A may gather sufficient information to securely generate billings associated with user A's usage of creator B's content and based on a "rental" model (e.g. distributor A may, for example, have included a meter method that records each calendar month that user A makes use of creator B's content, and relates to further control information that charges user A \$10 per month for each such month during which user A makes use of such content.) User/distributor A may receive control information C.sub.B directly from creator B. In this case, creator B may use VDE to negotiate with user/distributor A and deliver a set of control information C.sub.B that may be the same or differ from that described above in connection with the distribution relationship established between creator B and distributor A. For example, user/distributor A may receive control information C.sub.B that includes a requirement that user/distributor A pay creator B for content decrypted by user/distributor A (and any participant receiving distributed and/or redistributed control information from user/distributor A) at the rate of \$0.50 per kilobyte. As indicated above, user/distributor A also may receive control information associated with creator B's VDE content container from distributor A. In this example, user/distributor A may have a choice between paying a "rental" fee through a chain of handling passing through distributor A, and a fee based on the quantity of decryption through a chain of handling direct to creator B. In this case, user/distributor A may have the ability to choose to use either or both of C.sub.B and D.sub.A (C.sub.B). As indicated earlier in connection with a chain of handling including creator A and distributor A, user/distributor A may apply her own control information to the extent permitted by C.sub.B and/or D.sub.A (C.sub.B) to form the sets of control information UD.sub.A (C.sub.B) and UD.sub.A (D.sub.A (C.sub.B)), respectively.

Detailed Description Text (1428):

In this example, creator C produces one or more sets of control information C.sub.C associated with a VDE content container created by creator C, as shown in FIG. 82. FIG. 82 further shows the VDE participants who may receive enabling control information related to creator C's VDE content container. The content in such a container is, in this example, organized into a set of text articles. In this example control information may include one or more component assemblies that describe the articles within such a container (e.g. one or more event methods referencing map tables and/or algorithms that describe the extent of each article). C.sub.C may further include, for example: (a) a requirement that distributors ensure that creator C receive \$1 per article accessed by users and/or user/distributors, which payment allows a user to access such an article for a period of no more than six months (e.g. using a map-type meter method that is aged once per month, time aged decryption keys, expiration dates associated with relevant permissions records, etc.), (b) control information that allows articles from creator C's container to be extracted and embedded into another container for a one time charge per extract/embed of \$10, (c) prohibits extracted/embedded articles from being reextracted, (d) permits distributors to create enabling control information for up to 1000 users or user/distributors per month, (e) requires that information regarding the number of users and user/distributors enabled by a distributor be reported to creator C at least once per week, (f) permits distributors to enable users or user/distributors to perform up to one move of enabling control information, and (g) permits up to 2 levels of redistribution by user/distributors.

Detailed Description Text (1429):

In this example, distributor B may establish a distribution relationship with creator C. Distributor B in this example may have established a business model that favors the distribution of control information to users and user/distributors that bases payments to distributor B based on the number of accesses performed by such VDE participants. In this example, distributor B may create a modified set D.sub.B

(C.sub.C) of enabling control information for distribution to users and/or user/distributors. This set D.sub.B (C.sub.C) may, for example, be based on a negotiation using VDE to establish a fee of \$0.10 per access per user for users and/or user/distributors who receive control information from distributor B. For example, if one or more map-type meter methods have been included in C.sub.C to ensure that adequate information may be gathered from users and/or user/distributors to ensure correct payments to creator C by distributor B based on C.sub.C, such methods may be preserved in the set D.sub.B (C.sub.C), and one or more further meter methods (and any other necessary control structures such as billing and/or budget methods) may be included to record each access such that the set D.sub.B (C.sub.C) will also ensure that distributor B will receive payments based on each access.

Detailed Description Text (1435):

In this example, distributor C may receive VDE content containers from creator B, creator C, and creator D, and associated sets of control information C.sub.B, C.sub.C, and C.sub.D. Distributor C may use the embedding control information and other control information to produce a new container with two or more VDE objects received from creator B, creator C, and creator D. In addition or alternatively, distributor C may create enabling control information for distribution to users and/or user/distributors (or in the case of C.sub.D, for distributors) for such received containers individually. For example, distributor C may create a container including content portions (e.g. embedded containers) from creator B, creator C, and creator D in which each such portion has control information related to its access and use that records, and allows an auditor to gather, sufficient information for each such creator to securely and reliably receive payments from distributor C based on usage activities related to users and/or user/distributors enabled by distributor C. Furthermore, distributor C may negotiate using VDE with some or all of such creators to enable a model in which distributor C provides overall control information for the entire container based on a "uniform" fee (e.g. calculated per month, per access, from a combined model, etc.) charged to users and/or user/distributors, while preserving the models of each such creator with respect to payments due to them by distributor C based on C.sub.B, C.sub.C, and/or C.sub.D, and, for example, resulting from each of their differing models for the collection of content usage information and any related (e.g. advertising) information.

Detailed Description Text (1442):

FIG. 84 reflects certain aspects of a relatively simple model 3400 of VDE content distribution involving several categories of VDE participants. In this instance, and for simplicity of reference purposes, various portions of content are represented as discrete items in the form of VDE content container objects. One or more of such content portions may also be integrated together in a single object and may (as may the contents of any VDE content container object if allowed by content control information) be extracted in whole or part by a user. In this example, publishers of historical/educational multimedia content have created VDE content containers through the use of content objects available from three content resources: a Video Library 3402 product available to Publishers on optical discs and containing video clip VDE objects representing various historical situations, an Internet Repository 3404 which stores history information text and picture resources in VDE objects which are available for downloading to Publishers and other users, and an Audio Library 3406, also available on optical discs, and containing various pieces of musical performances and vocal performances (for example, historical narrations) which can be used alone or to accompany other educational historical materials.

Detailed Description Text (1444):

In this example, the Video Library 3402 control information allows publishers to extract objects from the Video Library product container and content control information enabling use of each extracted object during a calendar year if the

object has a license cost of \$50 or less, and is shorter than 45 minutes in duration, and 20,000 copies of each of any other extracted objects, and further requires all video objects to be VDE fingerprinted upon decryption. The Audio Library 3404 has established similar controls that match its business model. The Internet Repository 3406 VDE containerizes, including encrypts, selected object content as it streams out of the Repository in response to an online, user request to download an object. The Repository 3406 may fingerprint the identification of the receiving VDE installation into its content prior to encryption and communication to a publisher, and may further require user identification fingerprinting of their content when decrypted by said Publisher or other content user.

Detailed Description Text (1445):

The Publishers 3408 in this example have selected, under terms and conditions VDE negotiated (or otherwise agreed to) with the providing resources, various content pieces which they combine together to form their VDE object container products for their teacher customers. Publisher 3408(A) has combined video objects extracted from the Video Library 3402 (as indicated by circles), text and image objects extracted from the Internet Repository 3404 (indicated by diamonds), and one musical piece and one historical narration extracted from the Audio Library 3406 (as indicated by rectangles). Publisher 3408(B) has extracted a similar array of objects to be combined into his product, and has further added graphical elements (indicated by a hexagon) created by Publisher 3408(B) to enhance the product. Publisher 3408(C) has also created a product by combining objects from the Internet Repository 3404 and the Audio Library 3406. In this example, all publisher products are delivered, on their respective optical discs, in the form of VDE content container objects with embedded objects, to a modern high school for installation on the high school's computer network.

Detailed Description Text (1446):

In this particular example, End-Users 3410 are teachers who use their VDE node's secure subsystems to access the VDE installation on their high school server that supports the publishers' products (in an alternative example, the high school may maintain only a server based VDE installation). These teachers license the VDE products from one or more of the publishers and extract desired objects from the VDE product content containers and either download the extracted VDE content in the form of VDE content containers for storage on their classroom computers and/or as appropriate and/or efficient. The teachers may store extracted content in the form of VDE content containers on server mass storage (and/or if desired and available to an end-user, and further according to acceptable pricing and/or other terms and conditions and/or senior content control information, they may store extracted information in "clear" unencrypted form on their nodes' and/or server storage means). This allows the teachers to play, and/or otherwise use, the selected portions of said publishers' products, and as shown in two instances in this example, add further teacher and/or student created content to said objects. End-user 3410(2), for example, has selected a video piece 1 received from Publisher A, who received said object from the Video Library. End-user 3410(3) has also received a video piece 3 from the same Publisher 3408(A) wherein said piece was also available to her from Publisher 3408(B), but perhaps under not as favorable terms and conditions (such as a support consultation telephone line). In addition, end-user 3410(3) has received an audio historical narration from Publisher 3408(B) which corresponds to the content of historical reference piece 7. End-user 3410(3) has also received a corresponding historical reference piece 7 (a book) from publisher 3408(2) who received said book from the Internet Repository 3404. In this instance, perhaps publisher 3408(2) charged less for said book because end-user 3410(3) has also licensed historical reference piece 7 from him, rather than publisher 3408(1), who also carried the same book. End-user 3410(3), as a teacher, has selected the items she considers most appropriate for her classes and, through use of VDE, has been able to flexibly extract such items from resources available to her (in this instance, extracting objects from various optical products provided

by publishers and available on the local high school network server).

Detailed Description Text (1477):

Through use of the present invention, electronic appliances can be "leased" or otherwise provided to customers who, rather than purchasing a given appliance for unlimited usage, may acquire the appliance (such as a VCR, television, microwave oven, etc.) and be charged according to one or more aspects of use. For example, the charge for a microwave might be for each time it is used to prepare an item and/or for the duration of time used. A telephone jack could be attached, either consistently or periodically, to an inexpensive modem operatively attached or within the microwave (the modem might alternatively be located at a location which services a plurality of items and/or functions--such as burglar alarm, light and/or heat control). Alternatively, such appliances may make use of a network formed by the power cables in a building to transmit and receive signals.

Detailed Description Paragraph Table (12):

Event Type Successful Initialization completed successfully. Events User authentication accepted. Communications established. Channel loads set for specified values. Decryption completed. Key information updated. New budget created or existing budget updated. New billing information generated or existing billing updated. New meter set up or existing meter updated New PERC created or existing PERC updated. New objects registered. Administrative objects successfully processed. Audit processed successfully. All other events. Failed Events Initialization failed. Authentication failed. Communication attempt failed. Request to load a channel failed. Validation attempt unsuccessful. Link to subsidiary item failed correlation tag match. Authorization attempt failed. Decryption attempt failed. Available budget insufficient to complete requested procedure. Audit did not occur. Administrative object did not process correctly. Other failed events.

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CLAIMS:

5. The method of claim 4, in which: the first requirement includes a requirement that a first payment method be used; the second requirement includes a requirement that a second payment method be used; the first information identifies a payment method other than the first payment method; and the second information identifies the second payment method.